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Event and Comment.

The Dairying Industry—Its Value to the State.

ON the occasion of the opening of the new modern butter factory at Esk, the Minister for Agriculture and Stock, Mr. W. Forgan Smith, who performed the ceremony, reviewed the position of the dairying industry and its value to Queensland. In the course of a notable address he said that the progress of the factory which it was his privilege to open that day typified the advancement of the industry throughout the State, which, in round numbers, was worth over £5,000,000 per annum. The progress that had been made during the last decade was exemplified by a comparison of the production of butter and cheese. In the year 1914 there were 37,230,240 lb. of butter and 7,931,869 lb. of cheese manufactured, whilst the corresponding figures for the year 1925 were 67,731,435 lb. of butter and 13,980,538 lb. of cheese, and for the past year—during which production was affected by drought conditions—50,991,985 lb. of butter and 8,740,355 lb. of cheese. Science had appreciably assisted towards perfecting the process of manufacturing butter, and there existed to-day a widespread knowledge of the process of neutralisation and pasteurisation of cream, which were important practices in the manufacture of butter. It was not sufficient, however, that scientific methods should be adopted solely at the factory. There was to-day a growing necessity that every dairy farmer should have a complete knowledge of animal husbandry and of agriculture, so that he would be able both to care for and feed the animals upon which he relied for his livelihood. In that connection it was interesting to note that the average butter fat

yield from dairy herds in Queensland was not more than 120 lb. per capita, whilst in New Zealand it was 230 lb., and in Denmark close to 400 lb. The feeding and breeding of a dairy herd required careful direction, and the conservation of fodder was essential on every dairy farm, together with the utilisation of pedigreed sires which had been raised from families with accredited high production of butter fat.

Assisting the Man on the Land.

IN these directions, continued the Minister, the Government rendered monetary assistance to the man on the land. Advances for the purpose of erecting a silo and for the purchase of the appliances necessary to transfer the fodder into the silo were available from the Agricultural Bank. A subsidy on a fifty-fifty basis on the purchased price of approved bulls up to an amount of £50 was also made available by the Government. Herd testing was also conducted by officers of the Department of Agriculture free of cost to the dairy farmers, and this concession made it difficult to understand why dairy farmers continued to milk herds of dairy cows without seeking to obtain precise knowledge as to which are the profitable and which are the unprofitable units of the herd. Herd-testing results definitely and actually determined this issue, which was one of vital concern to the owner of the herd. High-producing cows, good feed, and efficient methods, made for success in dairying. On the other hand a low-producing dairy herd meant drudgery, privation, and sometimes poverty to the owner. It was a form of national wastage to expend time and energy in keeping a herd of milch cows which were, under all conditions, incapable of returning sufficient butter fat to repay the cost of labour and feed bestowed upon them. Not more than 10 per cent. of the herds in the Esk district had been subjected to the butter fat test, although officers of the Department of Agriculture were ever ready to carry out the work of herd testing without cost to the dairy farmer.

"Queensland's Best is Equal to the World's Best."

"QUEENSLAND'S best is equal to the world's best," added Mr. Forgan Smith, and the figures he had quoted in connection with the average butter fat yield indicated that the dairy farmers of this State were placing their reliance on cows which were incapable of producing sufficient butter fat to permit of dairying being as profitable as it should be. Continuing, Mr. Smith said that the quality of the dairy produce in this State had been raised to a very high standard, and to-day it compared favourably with that of any State in the Commonwealth. Queensland manufacturers had secured places of merit in important competitions in which the butter and cheese of other States had been exhibited. Honours at the Islington Dairy Show of Great Britain had been secured by Queensland dairy produce. It was for manufacturers to maintain this high standard of quality, and wherever practicable still further to improve upon it.

Dairying Economics.

THE Departmental Economic Committee, which was instituted by the Minister for Agriculture and Stock (Mr. W. Forgan Smith) for the purpose of investigating thoroughly the business side of farming, is still engaged on a general inquiry into the position of the dairying industry. The complexity of the conditions surrounding the industry has been recognised as well as the need for completeness in inquiry and accuracy in conclusions. It is realised that more than a mere academic investigation is required. Ordinary working conditions in districts regarded as typical Queensland dairy country, and which provide a wide enough variation in climatic and physical features, have been investigated by the committee at first hand, and results, after being carefully tested, will be available shortly for publication. The wide range of the factors governing dairying in the field, factory, and market has necessarily made the work of the committee very arduous, but it has now arrived at the stage when finality along practical lines need not be unduly deferred.

Its work to date has entailed—(1) A complete survey of existing conditions—the importance of the industry, the number of people engaged in it, capital invested, and so forth; (2) The value of herd testing and how it can be put into general practice; (3) Fodder conservation in all its aspects; (4) A study of manufacturing processes and factory efficiency; and (5) Present marketing conditions and the possibility of their appreciable improvement.

In general, the committee has established bases from which conclusions may be drawn and tested thoroughly in practice; and all this will be embodied in a comprehensive report now in course of preparation.

The Fine Discipline of the A.I.F.—A Tribute to Australians.

THE discipline of the Australian Imperial Forces was eloquently defended by General Sir John Monash when addressing the delegates to a recent dental congress in Melbourne. Sir John challenged any one to say that the discipline was not on the highest pinnacle of perfection. In the trenches the Australian soldier was more dependable than any other soldier with whom he had come in contact. Australian individualism was better for the successful conduct of a campaign than the converting of men into machines. In the post-war period of demobilisation the Australian army was the only army of all the Allies in which there was never a suggestion of mutiny or insurrection. Every other army, even some of the crack British regiments, experienced this happening, which was often accompanied by bloodshed. The high level of intelligence of the average Australian, our system of public education, and the sporting proclivities of this country were among the principal reasons which accounted for the excellent discipline in the Australian forces. The great majority of the Diggers regarded the war as a game, which they were determined to win.

Produce the Very Best—The Need of Technical Efficiency.

“THERE is a marked tendency for the acceptance of mediocrity in respect of our products and our production,” said Professor E. J. Goddard, D.Sc. (Professor of Biology at the Queensland University), when addressing the students of the Ipswich Technical College recently.

“If Australia is to progress, she will first have to succeed in attracting to her problems of production, primary and secondary, technical and non-technical, the best, or some of the best, individuals of the community. This will only eventuate when conditions are made sufficiently attractive, and, in so far as technical officers are concerned, their value assessed at a higher standard than at present.

“If Australia is to be maintained as a White Australia,” continued Professor Goddard, “we have got to recognise that problems of specially Australian nature have to be met, and it is essential that Australia should have available within itself the maximum technical efficiency. Australians are too prone to be satisfied with producing without considering the necessity for producing the very best. This calls for the greater appreciation of technical efficiency, and it is in this connection that the technological institutions are endeavouring to play their part. The availability of occupation in connection with many problems is unfortunately small, or absent, in many cases, inasmuch as the community as a whole has not yet evaluated the necessity for the employment of efficiently equipped technical officers and advisers. How many of our secondary industries employ scientifically trained officers? I refer to industries which, in other parts of the world, do employ such officers as chemists, chemical engineers, &c. In other parts the employment of such men is regarded as essential as advertising, and yet here no need for such men is appreciated. Australia, in so far as her technical achievements in industries are concerned, will not discharge her responsibilities and effect the progress that she might until the necessity for employing good technical officers is appreciated. When the community does recognise the value of such men, and takes action accordingly, then the various institutions, universities, technical colleges, and technological institutes will be able to achieve more than it is possible for them to achieve to-day.”

Bureau of Sugar Experiment Stations.

CANE PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report from the Assistant to Pathologist (Mr. E. J. F. Wood, B.Sc.) from 1st August to 27th August, 1927:—

INGHAM.

This district is showing less disease than any other which I have visited so far this year, and this happy state of things has only been attained by carefully supervised seed selection. Both of the Colonial Sugar Refining Company's mills have a staff trained to supervise seed and to watch the spread of the various diseases. They also attend to the pest which is doing most damage in the area—namely, rats.

The result is that the farmers only plant a restricted number of varieties, and they either choose the healthiest block on their own farm, or else buy seed from a healthy farm through the company. This ensures not only that varieties susceptible to disease are eliminated, but also that the plants used are free from disease, as far as possible. The farmers are so used to the company supervising the plant that they are only too willing to have this control, and they all realise the benefit of the system.

Only one badly-gummed field was seen during my visit here, and that is a radical change from the state of affairs in the district a few years ago, when Gum was dangerous in the Macknade area. Since Clark's Seedling has been cut out, the percentage of Gum has decreased, and the field mentioned above was an old ratoon crop composed of Clark's Seedling, Badila, and Korpi, all showing the disease. Owing to the complicated nature of the factors which control the infection with this disease, it would be rash to state that Gumming has been practically eradicated, but it is safe to state that it will not again get out of control as long as the present methods are continued. In addition, the company are trying, by seedling raising and by the importation and trial of varieties, to breed a stock of canes which will show resistance to the disease in case some of the present varieties—e.g., H.Q. 409—should become heavily infected, for this variety is moderately susceptible.

I have mentioned at length the methods employed here, as I wish to point to them as an example that other mills would do well to follow. Many districts lose more than £1,000 per annum through diseases, and it would pay them to employ a field officer who could carry out disease control work under the instructions of the officers of the Bureau. Each district requires the continual supervision of one or more officers in connection with the planting alone, and the field officers of the Bureau would then be able to devote time to the important problems presented by each disease, which is at present impossible, and will remain so until there is a staff far larger than that at present contemplated.

The general position with regard to diseases here is that Leaf Stripe, Mosaic, and Leaf Scald are present here and there to a very limited extent, but wherever they are found to occur, the field is ploughed out after harvesting and thus they are completely under control.

In the case of Gumming the position is slightly different, as this disease seems to react to seasonal variations that are not yet completely explained. Although it would seem that the position was entirely under control, except for a few exceptional cases which are becoming less each year, there is just the possibility that the recent seasons have not been favourable to Gum, though this year is one in which we should expect the disease to occur if it is still active. There is no doubt, however, that the Colonial Sugar Refining Company are working on the right lines, and that it is only a matter of time before Gumming will cease to trouble the Herbert River farmers.

Gum does not seem to be showing in the Toobanna area, even in H.Q. 426, where the trouble has been reported previously, but this fact may lull the farmer on to false security unless he continues his vigilance. Q. 813 seems to be doing well in this area, and as it is resistant to Gum, it will be well to plant it rather extensively, though on the richer soils of the river area it is not recommended.

The new varieties, Korpi, Oramboo, and Nanemo, seem fairly resistant to Gum, though Oramboo has been seen showing Mosaic. They are doing well, and I should

recommend their trial in the Bundaberg district for Gum and Mosaic resistance, in limited quantities under supervision.

A great deal of the cane in the Victoria area shows the Leaf Sheath Fungus round the lower end, but as the roots have adhering to them a large amount of soil, it is possible that this is due to the flood.

The flood killed a great deal of cane in the worst affected areas, and much of this has side shot, giving an appearance very similar to Top Rot, so that it is hard to distinguish between Flood Rot and Top Rot. It is possible that this similarity is more than superficial, as red streaks often appear in this flooded cane similar in appearance to those in Top Rot. This was noticed in the Giru area, and has been observed here and in the Freshwater area by Mr. Gibson.

Linear bugs are very prevalent here just now on the leaves of the cane, and though they do not seem to cause any damage, as sucking insects they are worthy of the closest attention, for it is possible that they may be capable of transmitting disease.

Various leaf hoppers are also infesting the cane, and the life histories of these might be interesting from the pathologist's point of view. It seems to me that far too little is known of the vectors of Gum, Leaf Scald, and Fiji disease, and that there is a wide field for investigation.

Owing also to the flood is the fact that in the worst affected areas the farmers are planting badly-flooded cane, which has side shot badly, and the stem of which is in many cases rotted or eaten out by borer. From the point of view of the disease question this is very bad practice, and it would pay to get plants from a healthy region if possible. While this cane may give a strike, it is not healthy, and is very susceptible to disease.

Another important matter requiring attention is the drainage of the farms, especially those affected with Gum. It is well known that the home of this disease is in badly-drained farms, and as in many cases the subsoil is a heavy clay, there is a formation very favourable for the disease. It will pay the farmers to install a system of main drains to take the water from the farms, and to run the water from the paddocks by frequent deep-water furrows. This method of drainage was adopted at Broadwater to combat the Gumming there, and it had an immediate result.

TULLY.

There are three diseases which are affecting the Tully area—Leaf Scald, Top Rot, and Spindle Top, or Sclerotial disease.

Leaf Scald is at present appearing in the chronic stage throughout the area, and a few stools were found in farms on the Lower Tully. One field was seen showing 30 per cent. of Scald, and the consequent loss of crop was serious. True, this is an unusually severe case, but it shows what the disease can be if it is not watched.

There are two phases of this trouble, the acute and the chronic. In the acute phase, the plant dies, and unless it suckers, as it most frequently does, it is very difficult to definitely diagnose the disease.

In the chronic phase, the most notable symptom is the chlorosis or whitening of the leaves of the affected stool, and the growth of side shoots from every eye along the stem. In these shoots, which are also chlorotic, one can often see white pencil lines extending from the base of the leaf to the edge, and often broadening out into a white indefinite streak. At times, too, the pencil lines become red in colour. These lines can often seen in the older leaves of the main shoot, while some of these frequently curl inward. This curling is often a symptom which leads to the recognition of the pencil lines. These can also be seen at times in suckers of the acute stage.

The appearance of the disease is periodic, and at times it is very hard to find, even where it is known to be present. Just now it is showing up well at the Tully, but is not easy to see at Innisfail.

Control measures consist of, if possible, getting rid of the most susceptible variety, but in the case where 99 per cent. of the crop is Badila, and this cane is showing moderate susceptibility, there is only one remedy—the eradication (which includes digging out and burning) of infected stools.

For this purpose, and for that of seed selection, I should suggest that the importance of having a trained man continually on the spot be fully recognised. These diseases cause unrealised losses to the farmer every year, and they can be completely controlled by properly supervised seed selection. A man stationed

permanently at the mill would be able to give advice to the farmers as to where to get seed cane, and would, by making periodical inspections, be able to give details of the location of and loss caused by the diseases. He would also be able to give information as to where healthy seed could be obtained in the district, and to control all canes brought from other districts.

Top Rot is present in parts, especially in the Lower Tully area, and mainly in flooded cane. We have here again the connection between the weather conditions and Top Rot, for the appearance of the disease was heralded by heavy rains following a dry spell. It does not seem to be causing extensive damage, and gives no cause for alarm.

Spindle Top is a disease which is caused by a Sclerotial fungus, hence its other name of Sclerotial disease. This fungus forms on the trash, which it binds together near the top of the stick, and thus chokes the spindle, which later dies and rots, giving an appearance very similar to Top Rot. The cane, however, does not side shoot, and the top is not easy to pull out as is the case with Top Rot. Moreover, to the experienced eye there is an appearance about the dead leaves which is hard to describe, but distinguishes between the two diseases. The bound leaf sheaths have a pink coloration, and usually the leaves have a reddish blush extending about 3 in. from the heart. The disease is disseminated in two ways.

(1) It is carried on trash, and so it is a good thing to burn the trash in badly-infected fields. When taking plants from infected fields, which should be avoided as far as possible, do not leave any trash on the sets if it can be avoided.

(2) It is carried on the sets in some cases, as the fruits of the fungus can and often do, adhere to the cane. In the Tully area care should be taken to get clean seed, for the disease is by no means universal, and this applies especially to the planting of new blocks. Here again we see the necessity of a pathologist to carry on selection work.

With regard to Leaf Scald it is well to note that knives, implements, and even clothes can carry the disease, and the knives should be disinfected after cutting a diseased field.

Another important matter in connection with the Tully area is the introduction of varieties. At present about 99 per cent. of the crop is Badila, but as the land is cropped, much of it will fail to continue growing good Badila cane. Other varieties will have to take its place on the poorer patches, and the selection of these should be made with care, and by an expert. Korpi, H.Q. 426, and some other varieties are already in the district, and an endeavour should be made to keep the number of importations as low as possible. The farmers' league should arrange that these should be made through this Bureau to insure clean seed, and there should be a list of approved varieties, with all others, penalised. One or two farms should be selected for the trial of new canes, in trials planted and controlled by the Bureau or by the mill officer when one is appointed.

Apart from the disease question there is the matter of rats which are causing great damage to crops. Systematic poisoning should be undertaken, and in this the field mill officer seems also a necessity for the near future.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following report on El Arish district which was visited during August, 1927, by the Assistant Pathologist, Mr. E. J. F. Wood, B.Sc.

EL ARISH.

In the El Arish area, including Jaffa and Maadi, there occur the same diseases as in Tully.

Leaf scald is present in all parts of the area, to a greater or less extent, but is only causing appreciable damage on a few farms. Nevertheless, it is likely to become serious, and the selection of plants should be closely watched. It will be well to make the cutters sterilise their knives by dipping them for five minutes into boiling water before they start cutting on each farm. There is an increasing percentage of Clark's Seedling (H.Q. 426) in the area, and it is showing more Leaf Scald than I should like to see. It will be advisable to watch closely the planting of this variety, and even to give it up where the disease is present to any extent, for this variety is very susceptible. As the disease usually shows up in this cane in the acute stage, where the symptoms are hard to find, I should advise farmers to leave fields which are showing any dead canes when

they are seeking plants. It would also be well to try out Q. 813 in order if possible to replace Clark's Seedling, as it is probable that it will prove fairly resistant to the disease.

Top Rot was not definitely diagnosed on any of the farms visited in this area, but Spindle Top was seen on most fields. In this disease, the selection of plants, discarding those sticks of Badila which show a reddish instead of a black stem will repay the farmer.

The biggest curse of the sugar industry, so far as diseases and varietal deterioration are concerned, is contract planting. In this system, a gang of men, usually ignorant of the diseases, and often of the varieties of cane, are set to cut plants. Of course they cut anything and everything, with the result that no diseased, borer-infected, or weak canes are rejected, and the plants are really not fit to be put in. It is a feature of most of our diseases that they do not kill the stool outright, so a diseased plant will grow up from a diseased set, and thus infection spreads. If this system is to continue, it will pay the farmer to go through the plant block before it is cut, and to trash it and cut out with a cane knife any stools or canes which are not healthy and are unfit for plants. This will go far to minimise the evil, but a continuous inspection of the plants as they are cut is also needed to reject any sets attacked by borer or root diseases. This haphazard method of planting is the reason why it is so difficult to control diseases. If there is any part of the cane work that the farmer should personally carry out it is the plant selection and the planting, for upon these, to a far greater extent than on any subsequent work, the resulting crop depends. And this is the work to which, as a rule, he pays least attention. You will never see a stock breeder put his newest jackaroo to select the parents for his stock, yet it is a precisely similar thing that the farmer does every day. This does not only apply to the district under discussion, but to all the districts that I have visited this year.

I should recommend that variety trials be carried out in the El Arish area, in order that some definite information may be gained as to new varieties. The usual method employed by the farmers is not conclusive, and the trials should be planted and supervised by men of the Bureau who know something of the characteristics of the canes in question.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has made available for publication the following report for the period August, September, 1927, from the Southern Assistant Entomologist, Mr. R. W. Mungomery:—

The Mound-building Ant (*Aphaenogaster longiceps* Sm.).

The presence of a small mound-building ant on a few cane farms in the Bundaberg district has recently come under the writer's notice. The pest was first seen when inspecting a field of cane at Oakwood, which was known to be suffering damage from the cane grub *L. frenchi*. For the main part these ants are confined to a narrow piece of red sandy forest land, which does not differ to any extent from that surrounding it, and according to the present owner they have nested in the same strip of country for several years without any apparent increase. The general causes contributory to the final damage due to these insects will be discussed later, but in all, it consists of a severe stunting of the cane stools, and at first sight is suggestive of a mild cane grub infestation, but the affected stools do not show the yellowing of the outer leaves which is so typical of grub damage. Thus on a cursory glance the area held by the ants was thought to be an extension of the grub attack, but closer examination revealed the presence of several mounds scattered promiscuously throughout the rows of cane, and each mound contained one or more entrances leading to numerous underground galleries. Mr. Dormer reported the occurrence of an ant with similar habits from Tully (see "Queensland Agricultural Journal," January, 1926, page 46), but it is not known whether these two species are identical. A variety of the same ant was seen on my last visit to the Mackay district, and was plentiful amongst blady grass (*Imperata arundinacea*) at Sarina, but it was not found encroaching on the adjacent cane fields. This species cannot be classed as a serious cane pest, and, moreover, it is unlikely that it will spread to any great extent outside the small strips of country it now inhabits. Specimens have been sent to the National Museum, Melbourne, and have been kindly identified by Mr. J. Clark as *Aphaenogaster longiceps*, Sm., being of a pale-yellow colour and about one-fifth of an inch in length. They are of a retiring nature, and though occasionally observed skulking about the entrance of the mound or scouting further afield, none have been observed in the act of feeding. When disturbed in their

nests, they display no signs of hostility, but are more disposed to seek places of safety. They are active throughout the whole of the year, and a few days after rain they can frequently be seen bringing up particles of earth, the result of their tunnelling operations, and dropping them over the sides of the mounds. Where mounds occur near cane stools, the earth underneath these stools is quite honeycombed by their galleries, and cane roots penetrating this maze of tunnels have sometimes been found pitted. Mr. Clark does not think that the ants will eat the roots, but is more inclined to the view that they will break off the tiny root hairs which come in their way.

Found associated with these ants are species of subterranean aphides and hoppers, which live on the sap of the plant, which they extract from the roots by means of their suctorial mouth parts. These, no doubt, the ants attend, and in return for this attention their subterranean associates yield them globules of honey dew. The hoppers belong to the families Delphacidae and Jassidae, but so far the aphid remains unidentified, it most probably being a hitherto unrecorded indigenous species, and it will be dealt with more fully in a subsequent report.

This commensalism recalls the intimate association which exists in a somewhat parallel case—namely, that of the American cornfield ant *Lasius niger americanus* which cares for the eggs of the corn root aphid *Anuraphis maidiradicis* in its nest during the winter, transfers the aphids or stem mothers as they are then called, as soon as they hatch out, to the roots of weeds. Later in the spring when corn plants are available, the following generations are transferred to the corn roots.

Returning to our ant *A. longiceps* after this digression, it will be seen that the damage wrought by these pests is indirect as well as direct, and may be discussed under the three following headings:—

- (1) Mechanical damage done to cane roots by pitting and breaking off root-hairs, thus curtailing the plant food supply.
- (2) Physical effect produced by the galleries which the ants construct, tending to dry out the soil surrounding the rootlets quicker than the soil not so honeycombed. Thus the plant experiences drier conditions than it otherwise would if the usual action of capillarity were allowed to go on unhindered.
- (3) Their attendance on sap-sucking insects, which drive nourishment from the cane roots, and thereby have a weakening effect on the plant, makes them indirectly responsible for this damage.

Control Measures.

Various sugary poison baits containing arsenicals, such as have proved effective in killing other species of ants, have been used against this ant, but without any apparent success. However, since the feeding habits of *A. longiceps* are as yet unknown, any attempts in the use of poison baits must still be regarded as merely speculative.

Paradichlorobenzene was tried, and although it will probably be of greater service in the summer months, it was found during this last winter that if placed deep in the ground the fumigant would not evaporate, and if placed near the surface, diffusion of the vapours was so great on account of the strong westerly winds which prevail here throughout the winter, that the toxic properties of this chemical were to a large extent negated, and it proved of little discomfort to the ants which carried on their mound-building activities as usual.

Carbon bisulphide injected into the soil where their mounds occur has given the most promising results. This fumigant was injected at the rate of 1 drachm 55 minims twice on both sides of the cane stool. This represents the maximum dose injected into the soil with one stroke of the plunger of a Dank's injector. When using this implement it would be preferable that the footrest be placed in its highest position to allow the spear to penetrate to its greatest possible depth. Then with this adjustment made, it would be possible to sink the spear to a depth of 2 to 3 inches, inject, and again sink the spear until it has penetrated the soil to its limit, at which depth another injection is made. This will ensure the fumes penetrating to the lowest levels of the nest and will kill developing larvæ as well as adult insects.

Sometimes in large colonies part of the nest escaped fumigation, and after the lapse of three or four days the ants showed signs of activity by bringing out their dead and dumping them at some distance from the entrance. In such cases it would be profitable to fumigate once more, and if this treatment is persisted with whenever fresh mounds appear, this troublesome species would soon be exterminated.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received from Mr. E. Jarvis, the Entomologist at Meringa, the following report (August to September, 1927), detailing results of observations in connection with study of the pupal stage of the greyback cane beetle, "*Lepidoderma albobirtum*; Waterh.," pupæ of which may be ploughed up in this district during the months of September and October:—

NOTES ON THE PUPA OF OUR GREYBACK COCKCHAFFER.

Up to the present this life-cycle stage of our primary cane pest has been somewhat neglected, although the pupa has been figured and alluded to more than once in our various publications (see "Queensland Agricultural Journal," xvi., pp. 47-49, 1921).

As pointed out previously, it occupies a position of complete isolation in the soil, lying not only at a greater depth than the eggs of this species, but being placed in a specially prepared subterranean chamber, the smooth puddled walls of which are well calculated to effectually exclude small insect enemies and prevent it from getting too dry or being harmed by heavy rains.

Unlike the grub and beetle condition of this cane pest, there seems to be but one artificial method of combating its pupa—viz., by fumigating the soil of affected canefields during September and October after the cane has been taken off.

The probability of our being able to obtain success by this control method has been based firstly, on the knowledge that grubs of *albobirtum* usually construct their pupal chambers directly beneath the line of damaged stools; secondly, that the walls of this chamber, although more consolidated than the surrounding soil, are permeable by gases; and thirdly, that the breathing spiracles possessed by the pupæ in question render them very susceptible to the influence of poisonous fumes.

The Structure and Function of Spiracles.

The stigmata or spiracles, through which the outside air is able to freely pass into specialised tracheæ—situated segmentally in the bodies of both grub and pupa forms of our greyback cane beetles—are deserving of attention; since, quite apart from their curious structure, these slit-like openings probably aid us to secure high percentages of mortality when fumigating grub-infested soils with poison gases.

Looking at a larva of this species we shall notice on each side a row of nine spiracles, which are dark-brown in colour, circular, and slightly concave; the concentric middle portion, however, being pale-yellow and very convex. (Fig. 4 on plate.)

How the Pupa Breathes.

The stigmata of the pupa of *albobirtum* (greyback cockchafer) differ greatly from those found on the grub, such dissimilarity of form having probably resulted from adaptations designed to meet a changed condition of life. Whilst lying quietly in its subterranean chamber the spiracles on the sides of the pupa are in little danger of becoming clogged with dust or tiny particles of earth, so that instead of being closed externally like those of the grub (which tunnels constantly through the soil) the stigmata of the pupa possess no outer shield-like covering, the tubular mouths of the six large spiracles (three of which are shown at A., Fig. 1) being open to the outside air. Eighteen occur on each pupa, but, unlike those on the grub of *albobirtum*, comprise three distinct and interesting forms (see Figs. 1, 2).

Possibly the most important of these sets of stigmata from an economic standpoint are the six largest, already referred to, found on the sides of the first, second, and third abdominal segments. (Fig. 1 A.) These measure about 0.7 mm. in diameter, and when viewed with a pocket lens appear as short tubes about 1.00 mm. in length, which, if looked into, are clearly seen to be kept open by a series of chitinous rings (Fig. 3). Each of these spiracles is, in reality, an open mouth communicating with the respiratory system of the pupa, consisting of numerous air tubes known as tracheæ. Following this row towards the tail-end we shall notice four smaller stigmata, on each side of segments (Nos. 4 to 7—Fig. 1 B.). The first two of these consist merely of a V-like depression, while the spiracles on segments 6 and 7 are a little larger and more regularly concave. Radiating from the centre of all four will be seen six dark-brown lines.

Lastly, we must notice the strange-looking spiracles occurring on the lower surface of the abdomen of this pupa, situated centro-ventrally (Fig. 2), which happen to be quite different in structure from any of the others. While the first anterior one is practically circular, the remaining three are transversely elongate and sub-ovate; all four, however, projecting slightly from the surface of the abdomen. Unlike those placed on the sides of the pupa, the lip-like edges of the mouths and the interior portions of these ventral stigmata are densely fringed with fine hairs which form a felt-like covering and radiate towards the circumference

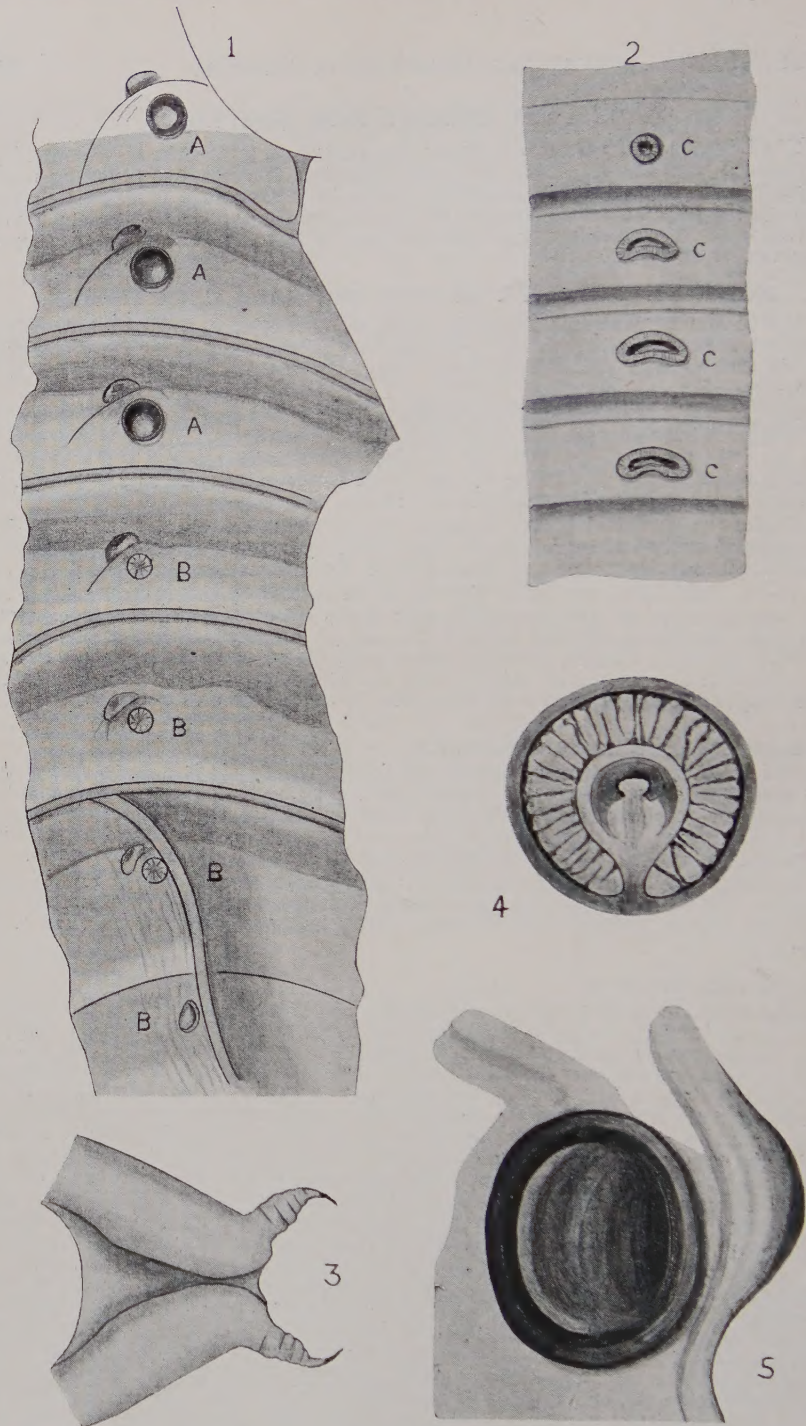


PLATE 94.

- Fig. 1.—Diagrammatic sketch of portion of size of Pupa, showing form and position of spiracles; ($\times 6$.) A.A.A., large tubular form; B.B.B.B., smaller form.
 Fig. 2.—Sketch of centro-ventral portion of abdomen, showing form and position of spiracles, C.C.C.C.; ($\times 10$.)
 Fig. 3.—Cremaster of pupa, showing horns at tail end; ($\times 5$.)
 Fig. 4.—Diagrammatic view of spiracle of grub; ($\times 30$.)
 Fig. 5.—Diagrammatic sketch of spiracle of pupa shown at Fig. 1. A.; ($\times 28$.)
 All illustrations original.

of each spiracle from a central point marking the tracheal opening. These hairs are designed to prevent entrance of minute soil particles, from which we may infer that during some phase of pupal development this particular portion of its exoskeleton comes into contact with, or is rubbed against, the floor or sides of its underground chamber.

Various complex movements doubtless take place in the profound darkness of its cell while the beetle is gradually freeing its legs and body from their chitinous covering, an operation which is performed a few weeks prior to emergence of beetles from the ground, and is probably attended with more difficulties than those experienced by a moth or butterfly when escaping from its chrysalis. In the case of our greyback, the two sharply-pointed spurs or the cremaster of the pupa (Fig. 3) would serve a useful purpose in this connection, as when forced into the compacted earthen wall of the pupal chamber in such manner as to anchor the end of the abdomen, the imprisoned beetle would have a chance by complicated twistings, &c., of the upper portion of its body to loosen, crack, and ultimately free itself from the enveloping pupal shell.

Notes on Depth of Pupal Chambers.

Some years ago (1915) the writer conducted tests during the month of October in order to ascertain the position of pupæ occurring in volcanic soil at Meringa. These were made by digging a number of pits 5 ft. square by 2 ft. deep. The first four of these holes contained collectively, a beetle (*albohirtum*), four larvæ, and twenty-three pupæ; besides thirty-two grubs of other species of Scarabæidæ (principally *Lepidiota frenchi* Blkb.) in various stages of growth. No pupal chambers occurred nearer than 1 ft. from the surface, and none deeper than about 15 in.; the majority being in soil that was nearly dry.

Pupæ have also been found by us at depths of 4 to 6 in. in sandy or sandy loam soils. Such great variation in depth (from 4 to 15 in.) must, I think, be attributed to the combined influence of temperature, moisture, drainage, and mechanical condition of infested lands, acting in conjunction with other agencies affecting the movements of the mature grub; possibly, at times, too, the aggression of certain predaceous soil-frequenting insect enemies chancing to be present in the soil when grubs happen to be tunnelling below to pupate.

Additional notes relating to this interesting life-cycle stage of our "greyback" will be supplied next month, which will deal with the question of fumigation of the pupæ of this pest, together with details as to the method of applying the fumigant, and its cost per acre.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

By EDMUND JARVIS, Entomologist.

Moth Borer causing "Dead Hearts."

Growers are advised to be on the look-out amongst young plant and ratoon shoots for evidence of the presence of the "Large Noctuid Moth Borer" (*Phragmatiphila truncata* Walker), the caterpillars of which are at present effecting damage in certain localities around Gordonvale. This insect is common also in the Burdekin district at times, where it is reported to destroy young cane plants by tunnelling in the central core, which is followed by death of the heart-leaves. Any diseased shoots or dead-hearts noticed should be cut out at a point about a couple of inches below ground level, and either crushed or burnt to kill the caterpillars or pupæ of this moth.

If this work were done at the commencement of the season, most of the moths responsible for the second and much larger brood of caterpillars would be destroyed. In cases of severe infestation the braconid parasites of this moth should be allowed to escape from diseased shoots (see "Australian Sugar Journal," vol. xvi., p. 247, 1924).

Methods of Fighting the Beetle Borer.

1. Liberate colonies of Tachinid flies (*Ceromasia sphenophori*) among affected stools. To enable these parasites to breed, about half an acre of borer-infested cane should be allowed to remain uncult for about six months after such liberation. *Note*.—Consignments of Tachinid flies will be supplied free of charge by the Sugar Bureau, upon application to the Entomologist in Charge of Meringa Experiment Station.

2. On areas where Tachinids have not been liberated it is advisable to burn the trash before cutting, by which means thousands of these weevil borers harbouring under old leaf-sheaths, as well as numerous grubs tunnelling in the canes, will be killed.

3. Cut twenty or more pieces of cane, eighteen inches long, split them in half lengthwise, and place same on headlands in a heap, which must be covered

over with sufficient trash or debris to prevent the cut surfaces from drying too rapidly. Visit these traps every second day to collect the weevil borers attracted to same.

4. Strip the trash, in order to establish conditions repellant to these beetles by destroying their hiding places, and admitting more light and air amongst the cane sticks.

5. Plant clean seed, free from indications of borer tunnels.



PLATE 95—INTERNAL AND EXTERNAL DAMAGE TO YOUNG CANE SHOOT CAUSED BY A CATERPILLAR OF THE "LARGE MOTH BORER" (*Phr. gn. atiphila truncata*, Walk.). NATURAL SIZE.

How to Obtain Valuable Hints.

The best way of obtaining entomological advice calculated to meet the needs of individual growers is to visit Meringa Laboratory when possible and have a chat with the entomologist.

One gets little in these days without making an effort of some kind; so if too far removed for personal interview a letter is the next best thing, and will always receive prompt attention.

Literature in the form of illustrated bulletins dealing with the numerous varieties of canes introduced into Queensland, the cultivation and manuring of sugar-cane, and methods of combating the various insect pests of same, can always be obtained by applying to the Director of the Sugar Bureau, Department of Agriculture, Brisbane, and should be in the hands of all intelligent growers.

FIELD REPORTS. 7

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has made available the following report from the Northern Field Assistant (Mr. A. P. Gibson):—

HERBERT.

The North Queensland winter has been truly delightful. The rainfall for the month was scanty; there had been more than enough prior to this, therefore the dried conditions were of a distinct advantage in promoting all seasonal work. August rainfall 10 points; for the year 90.66 inches.

The Ingham district was discovered in 1870. Sugar-cane culture commenced soon afterwards. The first sugar was manufactured at the Gairloch Mill, 1872. The varieties raised at the beginning were Bourbon and Black Java; these were badly rusted in 1876 and were supplanted by other less susceptible varieties. In 1890 a wave of prosperity commenced and has continued since. Some small mills were erected, but did not carry on for long. The factories that prospered were the Macknade, established by Messrs. Neames Bros. 1874 (afterwards purchased by the C.S.R. Co.), and Victoria, put up by the same company about seven years later. For the last three years the two local mills have crushed 1,115,662 tons of cane for 146,974 tons sugar, valued at some £3,367,030. For the week ending 20th August, Macknade milled 7,362 tons cane—its greatest tonnage for the same number of hours worked. Victoria in the same week lost a day and a-half's crushing owing to a break.

The Crop.—Cane is a hardy plant, it is wonderful how it recovered since the early floods. Immediately after the cyclone early in the year, the district crop was a very speculative one, but since it has improved with amazing speed. The prevailing sunshine is having a beneficial influence on its growth and quality, also permitting of its being removed with rapidity. At the moment it is considered to be far better than the previous crop, and is now estimated to yield 350,000 tons—25,000 better than last year. The H.Q. 409 part of the crop (about 30 per cent.) had recovered astonishingly well and is now heavy in flower—this generally marks the end of the growing period. The time for which cane can be left standing after arrowing is, of course, dependent on variety and season. Most of the Badila land was deeply inundated and the crop growing thereon seriously damaged or killed, and such destruction must naturally reduce the seasonal percentage of this kind.

Crushing operations commenced early in June. The work at the two local mills is proceeding smoothly and well. Practically no cane has been burnt so far. The enormous quantity of silt covering the harvested cane is hampering mill work, also causing more machinery wear than usual. Some 13,000 tons of cane is being crushed weekly, and the two mills must continue to go their hardest to complete the apparent ever-growing cane tonnage by the year end. About 7½ tons of cane is required to make a ton of sugar. Rapidity in removing the harvested crop from field to mill is of vital importance and is quite realised in this region. It is pleasing to note the clean condition of cane coming forward for treatment. The company endeavours to obtain 97 per cent. millable cane, but this high standard has been hard to procure because of the heavy stem shoots and most obstinate nature of ground leaf sheaths.

Planting.—Good and healthy crops cannot be expected in ill-drained, sour, poorly-tilled soils. The physical condition of some fields being planted is bad; this could have been improved by another ploughing. This part of the business is of paramount importance; equally important is the need of good seed. Seriously damaged cane was being planted in parts. This is the kind that has the great tendency of bringing about variety degeneration, and such seed is usually placed thickly—a wise precaution. More lime, more green manuring, and a superior draining system would improve subsequent crops. The area planted to cane for 1928 is greater than usual, and generally it has germinated favourably and is progressing well. Heavy rain falling immediately after planting has hardened some surface soils and hampered germination, but at the present moment the prospects for 1928 are most promising.

Varieties.—The following canes seem eminently suitable for this area:—Badila (always where it will grow), Oramboo, Korpi, Nanemo, H.Q. 409 on the wetter lands, and Q. 813 preferably for late planting.

Diseases.—At present the area is freer from diseases than the more northerly ones; such a pleasing state of affairs, it may be said, is the result of judicious

plant control. Less than three years back the gumming disease was very prevalent, now it is rather hard to find. This fact alone gives some idea of what can be done by skilful selection and the constant discarding of susceptible canes or anything not quite up to type. At Halifax, however, a badly gummed field of mixed ratoon canes was seen. The varieties affected were Badila, Korpi, and H.Q. 426, the latter susceptible variety more than likely was responsible for the infection.

Pests.—Rats, army worms, wire worms, black crickets, weevil, and big moth borer destruction was more or less noted. Poison baits are being spread at present to help control rats.

A farmer has been busy for many months removing flood-washed sand covering his valuable soil. Some 30 feet of sand covered a very promising crop of Badila on another farm inspected. Cane had been planted in sand, it had germinated favourably, but appeared sickly and, I think, must perish when the plant food becomes exhausted in the mother plant.

Macknade 1927 Seedlings.—Some 2,500 seedlings have been raised and were looking well.

TULLY.

Fourteen points of rain fell during the month, and the year's total now stands at 156.58 inches. The prevailing lengthy stretch of rainless weather had improved the crop quality, also permitting the advancement of all out-of-door work. Lack of soil moisture is beginning to have an ill-effect on the 1928 crop growth.

The Crop.—Badila, the king of its kind under the northern sun, is almost wholly grown. The crop in general had made much cane; it had grown and arrowed but little since my last inspection. Some heavy crops have been cut, 65 tons per acre seems to have been the greatest amount harvested. Superior crops and a higher c.e.s. may have been realised had some of the more matured ratoons been harvested earlier in the season in preference to the plant. It is pleasing to note that most fields are cutting out above early estimates.

Harvesting and grinding have proceeded smoothly to the present. Favourable weather has permitted the harvesters maintaining an adequate supply of cane; 25 per cent. of the mill supply is burned by permission before harvesting. 95,000 tons of cane had been milled to the 3rd September, and 90,000 tons or more yet remain to be crushed. The average mill c.e.s. has reached 13.5 per cent. and continues to rise gradually. Most of the cane coming in for milling could be much cleaner. Where farmers own the portable mills and have engaged three-men gangs to harvest the crops, the cane is very clean and a credit to them.

Varities.—Badila (N.G. 15) should be grown, as long as it will grow well, other sorts in the near future will probably be required to take the place of Badila on the less fertile lands, of which there is plenty; therefore it may not be out of place here to mention some canes suitable for such soils—Oramboo, Korpi, Nanemo, or H.Q. 409, and Q. 813 for late planting on the more cohesive soils. H.Q. 426 although a good sugar producer and doing well, cannot be recommended because of its great susceptibility to most diseases. 7R. 428 (Pompey) is not favoured, mainly because of its very poor quality. A crop of this kind raised on a Lower Tully River farm yielded 38 tons per acre, having an average c.e.s. of 10.5 per cent.

Pests.—Tully area with its many winding grassy creek banks is the home of the rat; the destruction from this pest is great in parts. Farmers are again urged to co-operate and try to keep this most destructive pest under control by systematic poisoning. Scrub turkeys are severely damaging the matured crops adjacent to the standing scrubs. Army worms are badly eating the leaves of ratoons. Weevil borer is not plentiful; it is, however, only a matter of time when this pest must become established in the area, being transported in the harvested cane from adjacent infested areas, also by the introduction of infected plants.

Diseases.—Leaf Seal: The area may be freed of this by more skilful selection of plants. Spindle or Needle Top is caused by a fungus which binds tightly the top leaf sheath to stem, thus causing a spindle-like top. This complaint is responsible for big annual Badila crop losses. The writer has observed this to be greatest where the growth of cane has been checked by grubs, stool crowding or smothering, too wet or too dry a soil condition. It is not recommended to plant these apparent weaker canes, for they must bring about plant degeneration and likewise carry infection to clean fields. Trashing probably would reduce the annual losses in sugar and weight. Insufficient care is exercised after trash burning in the loggy areas, and it is quite common to see fiercely burning stumps or logs within a few feet of the trash or standing cane. The vegetation is distinctly dry and if greater precaution is not taken, disastrous fires must follow.

EL ARISH.

This area is estimated to yield some 34,000 tons of cane, and about half of this total has been cut.

It is gratifying to note that the older planted fields are being cleaned up in readiness for the plough; explosives and fire are great helpers in reducing this laborious and costly work.

The Central Field Officer, Mr. E. H. Osborn, reports for month ending 12th September:—

MACKAY.**Farleigh.**

This area takes in some extremely broken country, for steep ridges carrying stones and boulders of all sizes are very common. Most of these ridges, however, carry good soil enabling good ratoons to grow, otherwise the difficulties of transportation to the tramway system would make the cost of production too great. Cane was grown on most of these ridges by coloured labour many years ago, and subsequently went out of cultivation. When replanted in later years thick, dense lantana had first to be removed, and the good quality of the present crops speak well for the value of lantana as a fertilizing agent. The mill was running smoothly with the staff showing a fine example of the value of co-operation.

The original estimate of 123,000 tons was expected to be realised and, with the exception of the cane from the newer lands upon the North Coast Railway, the density was very fair. Clark's Seedling was especially so, several 16.0 c.e.s. being recorded. Q. 813 was well up to its usual high standard with an average of 15.5 c.e.s. M. 1900 was also steadily improving, and so far seemed fairly free from Red Rot.

Cultivation.—With such a proportion of rough country, cultivation methods are not as good as they should be, very shallow ploughings being noticed on several farms, due no doubt to the hilly nature of the ground. Many of the Maltese farming in this particular part of the mill area do not worry about straight drills or drainage problems. Upon several badly-drained farms bedding up into small plots would improve the growing conditions immensely.

Fertilizing.—Very little is done upon the hillside farms near Costello, Habana, or the rougher portions of Richmond or Hill End. About the "Leap," Coningsby, and Foulden, however, a fair percentage of complete fertilizers are used and certainly seem to be giving satisfaction.

Green crops would be more popular, but dry spells and insect attacks often affect their germination. Many local growers formerly broadcast corn to plough in, but have now ceased owing to dangers from Mosaic.

Liming on the heavy low-lying soils is also practised, and the texture seems much improved thereby.

Cane Varieties.—Q. 813, H.Q. 426, M. 1900, N.G. 15, D. 1135, Malagache, Cheribon, Innis, E.K. 28, Q. 1092, and Uba are all grown hereabouts, the first-named four being the most popular; with Q. 813 easily in the lead. As mentioned earlier in this report, these canes are again proving their suitability in the local soils. N.G. 15 on the newer lands is also very good. E.K. 28 had just started to come into the mill, and was very fair in c.e.s. value. Q. 1092 as a cropper seemed good, but it arrows too freely and the density was only medium. Innis is still being grown, but owing to its partiality to Red Rot and Mosaic is likely to go out at any time. Uba is probably grown here in larger quantities than elsewhere in the Mackay area, but is not to be recommended and is gradually going out of cultivation. Q. 855 is only grown in odd places, but one Richmond grower claims very fair returns from it.

Diseases.—Mosaic and Red Rot were the principal diseases noticed:—

COSTELLO.

Mosaic—B. 147	..	..	..	2 farms
Innis	..	..	..	4 farms (heavy)
Cheribon	..	..	..	1 farm
H.Q. 426	..	..	..	2 farms (heavy)
N.G. 15	..	..	..	2 farms
M. 1900	..	..	..	2 farms

HABANA.

Mosaic—H.Q. 426	..	..	..	3 farms (heavy)
Innis	..	..	..	4 farms (heavy)
Red Rot—H.Q. 426	..	..	..	2 farms
Innis	..	..	..	2 farms

HILL END.

Red Rot—M. 1900	..	..	..	1 farm
Leaf Stripe—Green Cane	..	..	..	1 farm

RICHMOND.

Mosaic—H.Q. 426	..	..	..	1 farm
D. 1135	..	..	..	1 farm
N.G. 15	..	..	..	1 farm
Innis	..	..	..	1 farm (very heavy)

THE LEAP.

Red Rot—Innis	..	..	..	1 farm
Mosaic—Innis	..	..	..	1 farm
Cheribon	..	..	..	1 farm
D. 1135	..	..	..	1 farm

About Foulden four farms were visited, but no disease of any sort was noted; also the proportion of Q. 813 on them was probably greater than on many others.

The above figures show the large hold that Mosaic and Red Rot have on Innis, and growers should replace this variety with a cleaner variety. Growers had the diseased canes pointed out to them, and general control measures were outlined.

Proserpine.

Early in September and although dry this locality looked very well. Crops were cutting well up to estimates and the sugar contents very good. Some 55,000 tons had been crushed out of an estimate of 117,000, and the mill was doing very satisfactory work.

Planting was still being carried out with fair to medium strikes. Most of the land was in a very fair state of cultivation, but several fields were not, the ground being lumpy and showing far too much half-dead grass; while upon others it was apparent by the number of old cane stools about that the crop had been harvested, ploughed out, and after another ploughing, replanted straight away. Using the whole stick for plants, and then cutting up whilst lying in the drills was also a practice observed on some Italian-owned farms. From a disease point of view that practice is strongly condemned.

Varieties.—H.Q. 426 (Clark's Seedling), Q. 813, M. 1900, and N.G. 15 (Badila) are about the principal varieties grown in this area, and are all very good canes on certain soils, H.Q. 426 giving very good returns in the early part of the season. Q. 813 is still gaining more friends, as it is such a good striker and gives such consistently good c.e.s. figures both early and late. M. 1900 is also a very suitable cane, coming to its best about the middle of September. Badila (N.G. 15) upon good alluvial is always good and is worth growing wherever such soils are. E.K. 28 has rapidly become popular in this area; and some splendid crops of it are being cut, carrying exceptionally good tonnage and very fair density values. Nearly every grower is trying to plant some of this cane this year. E.K. 1 is grown in small quantities, and one Glen Isla grower speaks very well of it. 7R. 428 (Pompey): Some good crops of this are being harvested, some ratoons yielding about 14 c.e.s., and nearly 25 to 30 tons per acre being noticed.

Diseases.—Red Rot and a little Mosaic are the main diseases noticed, with the first named easily the worst, especially in low badly-drained heavy soil. H.Q. 426 (Clark's Seedling) seems to suffer far more than any other cane, and in nearly all fields inspected of this cane it was seen from an odd stool or two, to quite a few sticks in a stool nearly dead. B. 208 (plant) was also noticed to be suffering from same in a Glen Isla farm, and Striped Singapore upon a hillside farm near Cannon Valley was in a bad way.

Growers are again advised to be very careful of their seed, throwing out any stick that shows the slightest sign of redness when being cut into plants.

Mosaic was noticed in an odd stool of N.G. 24B up river, and in M. 1900 and Malagache second ratoons slightly at Waterson.

The Southern Field Officer, Mr. J. C. Murray, reports, 16th September, 1927:—

MOUNT BAUPLE.

Crushing was in full swing at the time of visiting this district, and everything appeared to be going smoothly. The c.e.s. value of the cane was showing fairly high, particularly the H.Q. 285, Q. 822, and Q. 813; L.K. 1 and 28 were also growing satisfactorily. There is not sufficient of the two lastmentioned canes growing yet for a really definite opinion to form as to their general value in the Bauple area; nevertheless these varieties are well worth a more extensive trial, and the growers are advised to give further trials to them.

It is to be impressed on the growers that variety experiment is of first-class importance. Every grower should carefully look after his collection, weeding out the useless ones and carefully selecting and developing those that are promising. The writer contends that, within reasonable limits, a cane can, by plant selection, be improved in every direction—thickness, length, sugar content, and resistance to disease.

Combined with selection should be careful tillage. Most growers cultivate well and carefully, but not many fully understand why they do so. In early times it was found by practising good cultivation nature gave of her best; now science can tell the farmer the reason why. Summarised are some of the benefits of good tillage:—

- (a) Facilitates planting and ensuring a start over the weeds;
- (b) Loosens soil and makes it fine;
- (c) Makes soil drain better and keeps it warmer;
- (d) Allows aeration of the soil; and
- (e) Stimulates the work of friendly bacteria.

Farmers in the Bauple district are considering the planting of a percentage of Uba. While Uba is not looked upon with favour by a great many growers of sugar-cane, nevertheless there are some farmers who have had good results from this cane. Uba belongs to a group of varieties known as the Japanese canes.

Sugar-cane generally can be divided into four groups, namely:—

- (a) The ordinary sugar-cane (*Saccharum officinarum*);
- (b) The Hawaiian purple canes;
- (c) The China canes; and
- (d) The Japanese canes.

A remarkable feature about the latter group is their extraordinary resistance to Mosaic. As far as the writer knows, the only one of the Japanese canes growing in Queensland is the Uba.

Frosts affected the cane somewhat in the Bauple area this year, although very little cane within an eight-mile radius suffered. The heaviest cane observed coming to the mill was Q. 813.

BEENLEIGH.

Approximately a fortnight was spent in this area, principally in connection with the control of Fiji disease. It is safe to say that, if prompt action had not been taken by the Bureau, there would have been very little cane unaffected with Fiji disease in the Beenleigh district a few years hence. It is almost tragic to see the way big, well-grown stools of cane get cut down with this disease.

The farmers are advised to be constantly on the alert, and not to neglect to destroy affected stools as soon as they are located.

Rain is badly wanted in this area, the dry state of the soil seriously interfering with planting. Many of the Beenleigh farmers have been producing for forty years. It cannot be too strongly impressed on the old-established farmers, that they should do more green manuring and, after local experiment, fertilizing, if they wish to be fully compensated for their labour. Full information on carrying out experiments, fertilizing to try, green manures, &c., can be obtained on application to the Bureau.

In regard to varieties, the farmers are recommended to plant Q. 813 and H.Q. 285. The cutting period for these canes is—H.Q. 285 (Miltons), July, August, September; Q. 813, October, November, December. H.Q. 285 is not a standover cane.

Harvesting in the Beenleigh district was proceeding smoothly. The bulk of the haulage is done with horse wagons.

RECORDS OF AUSTRALIAN THYSANOPTERA (THRIPS).

By A. A. GIRAULT, B.Sc.

PART II.

The following records are new and form an addition to those published in the May (1927) issue of this Journal. From them can be gathered such information as occurrence and distribution of the various species and what species frequent each plant. They also show the almost universal occurrence of certain species. Each is numbered as formerly, and the same arrangements hold here. As formerly, the the Government Botanist, Mr. C. T. White, kindly identified most of the plants.

1. *Thrips tabaci* Lindeman.—This species is now found to be more abundant than was at first thought. A female, *Chrysanthemum*, Hawthorn, Victoria, May, 1927. R. Kelly; *Lantana scallowiana*, Morningside, 11th October, 1925; from chickweed, *Stellaria media*, in a garden, Norman Park, 17th July, 1927; *Nasturtium* and *Freesia*, garden, Brisbane City, 12th August, 1927, I. W. Helmsing; *Ageratum* or billy-goat weed, August, in Brisbane; *Convolvulus crubescens*, forest, Norman Park, 6th August, 1927; injuring eschaloats, Sunnybank, 14th August, 1927, J. H. Smith; from roses, Mayne Junction, 22nd May and in August, 1927, A. R. Brimblecombe; cherry, Brisbane, 18th August, 1927; *Solanum nigrum*, Norman Park, 14th August, 1927; common in cultivated pea blossoms, Norman Park, 22nd August, 1927; *Chenopodium murale*, Brisbane, 17th August, 1927; Michaelmas Daisy, Mayne Junction, 21st August, 1927, A. R. Brimblecombe. At Brisbane, *Senecio didyma*, 20th August, 1927; *Galinsoga parviflora* and *Cestrum parqui*, 26th August, 1927.

2. *Thrips imaginis* Bagnall.—From mango flowers, Brisbane, 11th August, 1927; Wentworth, New South Wales, 1st October, 1926, R. Kelly; from roses, see No. 14 in Part I.; white clover again, Brisbane, 17th August, 1927; cultivated flowers, Morningside, 5th September, 1925; *Acacia saligna*, Mildura, Victoria, 1st October, 1926; *Gallardia*, Melbourne, Victoria, December, 1925, R. Kelly; *Lyonsia reticulata*, Mayne Junction, 21st August, 1927, A. R. Brimblecombe.

3. *Pseudanaphothrips achatus* Bagnall.—Flowers of *Pultanea* and *Convolvulus*, forest, Norman Park, May, 1927; *Leptospermum*, Morningside, 4th October, 1925, and cultivated flowers, 5th September, 1925; peach, Norman Park, 17th July, 1927, and on same date, same place, *Stellaria media*; *Lantana scallowiana*, Morningside, 11th October, 1925; *Pimblea linifolia* and *Tridax procumbens*, forest, Norman Park, 10th and 25th April, 1927. At same place on *Boronia polygalifolia*, May, 1927, and *Lobelia purpurascens*, April, 1927; also in May, 1927, on flowers of *Goodenia bellidifolia* and *Velleia spathulata*, on *Convolvulus crubescens* and *Goodenia rotundifolia*, 6th August, 1927, and on cultivated pea blossoms, 13th August, 1927. White clover, Norman Park, 28th November, 1926; *Wahlenbergia gracilis*, forest, Norman Park, 14th August, 1927; geranium, Mayne Junction, 21st August, 1927, A. R. Brimblecombe.

4. *Physothrips kellyanus* Bagnall.—Mango flowers, Norman Park, 11th August, 1927; also on 23rd July. From miscellaneous cultivated flowers, 25th April, 1927, Brisbane, A. R. Brimblecombe; lemon and flame tree, 22nd May, 1927, Brisbane, A. R. Brimblecombe; many females, lemon, 21st August, 1927, Mayne Junction, A. R. Brimblecombe; again from *Cestrum parqui*, Brisbane, August.

5. *Physothrips mjobergi* Karny.—From roses, Mayne Junction, 22nd May, 1927, A. R. Brimblecombe; from cultivated flowers, same place, 25th April, 1927, A. R. Brimblecombe; *Plumeria rubra* (Frangipani), Botanic Gardens, Brisbane, 22nd April, 1927, A. R. Brimblecombe.

6. *Physothrips brevicornis* Bagnall.—On *Hypochaeris*, Sherwood, 20th June, 1927, A. R. Brimblecombe; Aspley, 11th July, 1927, J. A. Weddell and S. M. Watson; Norman Park, 6th August, 1927; also very abundantly, same place, 13th August, 1927; on *Oxalis corniculata*, forest, Norman Park, 6th August, 1927.

In some of the above specimens (6th August) the head and prothorax were jet; in others abdomen quite pale excepting the last segment or two. In the specimen, a female, from the *Oxalis*, antennals 4-5 were dark on one side.

7. *Thrips lacteicarpus* Girault.—Mango, Norman Park, 4th August, 1927; on 2nd July, 1927, at the same place, very common in the flowers of the golden wattle and of two other wattles in August, 1927. Clover, Brisbane, 17th August, 1927; cherry, Brisbane, 18th August, 1927, and peach, same place, the day following. Strawberry, Raby Bay, 19th August, 1927, J. H. Smith; mango, Mayne Junction, 21st August, 1927, A. R. Brimblecombe; lemon, Mayne Junction, 21st August, 1927, A. R. Brimblecombe.

8. *Isononeurothrips australis* Bagnall.—Mango, Norman Park, 5th August, 1927. The *Cocos plumosa* record of Part I. was from Morning-side; and the species was obtained from *Eucalyptus* and *Leptospermum* flowers, at the same place, 4th October, 1925. Flowers, Wentworth, New South Wales, 1st October, 1926, R. Kelly; one female, lemon, Mayne Junction, 21st August, 1927, A. R. Brimblecombe.

9. *Idolothrips marginatus* Haliday.—Brigalow, Wallumbilla, 9th March, 1924; forest, Stanthorpe, 24th April, 1924; jungle, Montville, 16th September, 1923.

10. *Idolothrips lacertina* Haliday.—A male, flowers *Ægiceras majus*, Brisbane, 18th July, 1927, W. A. T. Summerville.

11. *Desmothrips bagnalli* Karny.—Forest, Banyo.

12. *Desmothrips tenuicornis* Bagnall.—Forest, Kingston.

13. *Physothrips uniformis* Bagnall.—Common, *Helichrysum apiculatum*, Norman Park, 14th August, 1927.

16. *Cryptothrips dimidiatus* Hood.—One apterous specimen, forest, Dayboro, 8th October.

18. *Physothrips cinctipennis* Bagnall.—Flowers of *Mesembryanthemum*, Mayne Junction, Brisbane, 22nd May, 1927, A. R. Brimblecombe; and of *Dolichos lablab* and *Phascolus lathyrnoides*, Brisbane, 16th April, 1927.

24. *Stylothrips brevipalpus* Karny.—Flowers of *Tridax procumbens*, Brisbane, 16th April and 10th May, 1927; on cultivated Michaelmas

Daisy, Mayne Junction, 15th May, 1927. A. R. Brimblecombe; flame tree, same place, 22nd May, 1927. A. R. Brimblecombe; white clover. Brisbane, 17th August, 1927; from *Eclipta alba* and *Galinsoga* again. City, Brisbane, 17th August, 1927.

28. *Horistothrips australia* Morgan.—Two females, forest Stanthorpe, 24th December, 1923. The head in this species exceeds the prothorax.

31. *Neophysopus fragariae* Girault.—Strawberry, Manly, 18th September, 1924, H. Tryon. Many specimens both sexes injuring fruit of same, "rusting" it, Wynnum, 27th July, 1927, H. Tryon.

32. *Phibalothrips rufiventris* (Girault).—Forest, Kingston.

33. *Hydatothrips poeta* Girault.—A female, forest, Gordonvale. The tibiae and most of the second and third pairs of femora in this specimen were yellow. The species is correctly placed.

34. *Polyphcmothrips brunneicarpus* Girault.—A male, forest, Mount Gravatt, near Brisbane, 11th May, 1923.

35. The notes in first part refer to a distinct variety *aligherini* Girault.

37. *Frankliniella aschylei* Girault.—Flowers of watermelon, Raby Bay, 24th February, 1927; from wild flowers, *Pultenaea* and *Cenchrus*, Norman Park, May, 1927.

38. *Heliothrips bifasciipennis* Girault.—A female from greenhouse plants, Queensland Museum, Brisbane, 17th August, 1927.

39. *Plesiothrips perplexus* (Beach).—On maize, Gympie, December, 1924.

40. *Odontothrips australis* Bagnall.—A female, *Glycine tabacina*, Norman Park, April, 1927; *Jacksonia*, same place, 14th May, 1927.

41. *Anaphothrips keatsi* (Girault).—This species was originally described from *Hibbertia stricta*. In April, 1927, many young larvæ and adults were found clustered upon unopened flower buds of the same plant at Norman Park. On 6th August, 1927, in the same place, adults were found abundantly, but no larvæ. The latter are of an orange colour.

42. *Horistothrips clavispilus* Karny.—Females, forest, Ipswich, June, 1919; Redland Bay, 23rd February, 1926.

43. *Cryptothrips finlayi* Girault.—A female, forest, Nambour, 21st October, 1923.

44. *Haplothrips partifuscipennis* Girault.—A female, mango blossoms, Norman Park, 3rd August, 1927; also 18th August, 1927.

This species was at first mistaken for *victoriensis*, but it has a tarsal tooth in both sexes, only the bases narrowly of the antennals 3-4 are pale (the head is longer than wide in both) and the wings are clear at each end. Moreover, tibia 3 is pale at base, antennal 4 is not enlarged and the bristles of dorsal abdomen from base are not stout.

A pair from cotton, Sunnybank, 8th June, 1923, F. G. Holdaway and J. H. Simmonds.

45. *Cryptothrips schilleri* Girault.—From galls on *Bursaria spinosa*, Healsville, Victoria, 27th November and 18th January, 1925, R. Kelly.

46. *Cryptothrips cybele* Girault.—A male, forest, Grandchester, 1st August, 1924. In this specimen the third antennal joint was suffused dusky. Also a pair in forest sweepings at Laidley, 31st May, 1923. The female has no tarsal tooth.

47. *Haplothrips froggatti* Hood.—A female, forest-brigalow, Mount Larcom, 3rd February, 1924; a male, forest, Wynnum; two females, forest, Gympie, 9th October, 1924; a female, brigalow, Wallumbilla, 9th March, 1924.

48. *Androthrips niger* Girault.—A second male, type locality.

49. *Mesothrips atrellus* Girault.—Forest, Wynnum, November.

50. *Haplothrips robustus* Bagnall.—The species *varius* Hood and *melanoceratus* Bagnall are synonyms. The species has a wide distribution, and in some places is found plentifully in hay. Many specimens on *Ptilotus*, Anakie, Victoria, 12th December, 1926, R. Kelly; a male, among many specimens of No. 51, was found in a collection made from cultivated Michaelmas Daisy, Mayne Junction, 22nd May, 1927, A. R. Brimblecombe; also from *Leptospermum scoparium*, Yeringberg, Victoria, 7th January, 1926, R. Kelly; and a female from cultivated flowers, Brisbane, August, 1927, A. R. Brimblecombe. The wings of this last were considerably narrower and the fore tibia black.

51. *Haplothrips gowdeyi* (Franklin).—This species is doubtless one of the commonest members of the order and is subcosmopolitan. In Australia it is perhaps the commonest species with the possible exception of Nos. 1, 2, and 3. It is by far the commonest tube-bearing thrips. The following records have accumulated:—

Strawberry, Raby Bay, 13th July, 1927, J. H. Smith; cultivated Gerbera and Daisy, Mayne Junction, 15th May, 1927, A. R. Brimblecombe; *Lobelia purpurascens*, forest, Norman Park, April, 1927; abundant on *Meembryanthemum* and cultivated flowers, Mayne Junction, 22nd and 25th May, 1927, A. R. Brimblecombe; *Amaranthus*, Brisbane, 13th April, 1927; Morning Glory and *Phaseolus*, Brisbane, 16th April, 1927; in sweepings in waste jungle, Flaxton, 3rd July, 1923; flowers of *Commelina cyanea*, *Panicum crus-galli*, and of water-melon, Raby Bay, 24th February, 1927; *Thunbergia alata*, Brisbane, 16th April, 1927; *Tridax procumbens*, Norman Park, 10th May, 1927; grass, same place, February, 1927; strawberry (larva on fruit), Wynnum, 27th July, 1927, H. Tryon; eschalot, Norman Park, 7th August, 1927; white clover and cultivated flowers, Brisbane, 17th August, 1927; *Goodenia rotundifolia*, Norman Park, 6th August, 1927; cultivated flowers, Brisbane, August, 1927, A. R. Brimblecombe; *Ageratum conyzoides*, Brisbane, 11th August, 1927; mango, 23rd July and *Hieracium*, 23rd February, 1927, Norman Park; lantana, Montville, 16th December, 1925; dandelion, Aspley, 11th July, 1927, J. A. Weddell and S. M. Watson; *Chenopodium murale*, Brisbane, 17th August, 1927; Michaelmas Daisy and geranium, Mayne Junction, 21st August, 1927, A. R. Brimblecombe.

In all the above specimens the sixth antennal segment was never clear yellow and sometimes the fourth and fifth were more or less infuscated.

52. *Thrips io* Girault.—Flowers of orange, at Mapleton, January, 1926 (with *Physothrips* spp.), and at Roma, 26th August, 1926, J. H. Smith. This is a puzzling species founded on males. It differs from *lacteicarpus* male solely in not having the upper vein of fore wing regularly setose but with only three well-developed setae from middle.

53. *Thrips fortis* Bagnall.—A female, forest, Stanthorpe, 24th April, 1924. The head was not quite as long as pronotum and the setæ between the post-laterals were dark, rather strong, and increasing in size towards meson. However, the specimen agrees otherwise and I think must be this species.

54. *Haplothrips nigroculus* Girault.—This is perhaps the next most common species of Tubulifera. It differs from *froggatti* in not having antennal 3 dark and distinctly much shorter than 4. In this species, the third segment of the antenna also exceeds segment 2, whereas in *froggatti* it is shorter than segment 2. I have seen specimens with the distal subbasal bristle capitate and with the post-ocular of one side closer to cheek than to eye. I have seen the following specimens since describing the species:—

A male on asparagus, Lakes Entrance, Gippsland, 22nd February, 1919, R. Kelly; *Cyperus pilosus*, 26th January, 1926, Morningside; *Bursaria spinosa*, Yeringberg, Victoria, 7th January, 1926; *Kunzia*, Warburton, Victoria, 12th December, 1924, R. Kelly; forest, Mareeba, 11th March, 1919; *Eucalyptus piperata*, Yeringberg, Victoria, 7th January, 1926, R. Kelly; upon opening buds, Mount Glorious, 12th September, 1926, W. A. T. Summerville; *Verbena erinoides*, Roma, 3rd December, 1925; Watsonville, 12th March; forest, Tumoulin-Ravenshoe, 12th March, 1919; forest, Herberton, 11th March, 1919; *Glycine tabacina*, forest, Norman Park, April, 1927; forest, Bakersville, 15th March, 1919. Also at Brisbane on *Acacia* and *Crotolaria*, 24th August, 1927. *Cassinia aculeata*, Yeringberg, 7th January, 1926, and *Eucalyptus rostrata*, Sutherland's Creek, Anakie, Victoria, 26th December, 1926, R. Kelly; forest, Mount Gravatt, 11th May, 1923; Gympie, 29th June, 1924; forest, Kingston; buffalo grass, Mayne Junction, 21st August, 1927, A. R. Brimblecombe; by the same, same place, 28th August, *Lyonsia reticulata*.

55. *Haplothrips victoriensis* Bagnall.—A female from lemon flowers, Mayne Junction, 21st August, 1927, A. R. Brimblecombe. The bristles on dorsal abdomen are much stouter and darker in this species than in No. 44.

56. *Desmothrips australis* (Bagnall).—A female from strawberry blossoms, Raby Bay, 23rd August, 1927, J. H. Smith. The legs are entirely black.

57. *Hydatothrips argenticinctus* Girault.—A male and several females of this beautiful species from the flowers of *Lyonsia reticulata*, Mayne Junction, 25th August, 1927, A. R. Brimblecombe. Mr. Brimblecombe first collected this species.

58. *Neophysopus* *io* Girault.—Rather abundant upon the flowers of the vine *Lyonsia reticulata*, Mayne Junction, 21st August, 1927, A. R. Brimblecombe. The larvæ apparently differ from those of *fragaria* by bearing wide, short, funnel-shaped lateral abdominal setæ.

“A WEALTH OF INFORMATION.”

Thus a *Mulgeldie* subscriber (25th July, 1927): “Many thanks for past Journals, which have contained a wealth of information to the man on the land.”

FARM TRACTORS.

By E. T. BROWN.*

When considering the power that is required to draw a plough through the soil a very important point to take into account is the evenness of the ground. Any rise will, of necessity, call for a greater amount of power. It is extremely difficult to estimate with any degree of accuracy what is the exact increase in power required, but there is a method of working out this point which is more or less satisfactory. The result arrived at is not as regards the extra power that is required, but as concerns the decrease in the available power at the drawbar. But this, of course, amounts to exactly the same thing in practice. For every 1 per cent. of gradient $1\frac{1}{2}$ per cent. of the total weight of the tractor and the plough must be deducted from the effective pull. Let us take a case in point. Say, the weight of the outfit is 45 cwt.; the gradient is 1 in 25 or 4 per cent.; and the drawbar pull is 1,500 lb. Deduct 4 times $1\frac{1}{2}$ or 6 per cent. of 45 cwt. (5,040 lb.), which is 302 lb. from 1,500 lb., thus leaving an answer of 1,198 lb. On a 1 in 25 gradient, therefore, the effective drawbar pull is 1,198 lb.

The Question of Wheels.

A considerable proportion of the power generated by the engine is required for the propulsion of the tractor and the fitting of suitable lugs to the wheels makes all the difference in the amount of available power at the drawbar. When this is realised, it will be easily understood that the size and width of the wheels fitted to the tractor will exert a great influence on the ease with which it can be propelled. It is not only that soil compression depends largely on these two factors, important though this point is, especially when working on some soils. A wheel of small diameter will sink considerably deeper into the soil than one will that has a greater circumference. Since the point of contact, moreover, is less with a small wheel the soil will be packed more. This brings us to the question whether it is not possible to get rid of the soil compression effect without increasing the diameter of the wheels. Increasing the width of the rims of the wheels will spread the pressure over a greater area of ground and will bring about the desired result, but only to a certain extent. It will decrease the depth of the compression, but it will spread it over a greater area, and this is just one of the things that we want to avoid. There is another reason why a wide wheel is not suitable. It is found to be very awkward in turning the tractor, since there can only be one true rolling point of contact with the ground, and, therefore, this necessitates one edge slipping backwards and the outer edge being driven forward. When gripping devices are fitted this tends to tear up the ground more than is desirable.

The Best Sizes.

It has been proved in practice that for a medium powered machine a 12 in. to a 14 in. wide wheel is the greatest that can be employed on good ground. Manufacturers have also proved that a 5 ft. diameter driving wheel can be fitted without causing any structural weakness, but that it is not advisable to exceed this measurement. These are the figures for good ground, but when working in very soft soil, it is possible to attach extension rims to the rear wheels, and in this way the advantages of a wide wheel are retained without any of the disadvantages. The extension, however, must be removed before working again on hard ground. A wheel of a fairly large diameter possesses another advantage over a smaller wheel. It is able to surmount obstacles more easily, and, therefore, less power is utilised on rough ground for the propulsion of the tractor. This is a point that is very frequently forgotten by tractor operators, but it exerts a distinct influence on the available drawbar pull.

Brake Adjustment.

Most tractors are fitted with the internal expanding or external contracting type of brake. Each is easy to adjust, and should be set in such a way that there is no friction when the brake is not being used, yet it should grip well when it is applied. From time to time it may be necessary to reline the shoes, but this is quite a simple job, and any good amateur can manage it. The best lining to employ is that made of asbestos and brass wire woven together, and this can be obtained from any motor store or garage. Holes should be drilled in the fabric to correspond with the holes in the shoes and copper rivets should be employed. The holes must be countersunk so that the rivet heads will sink well into the fabric. Inattention to the brakes may result in a serious accident, and thus they should always be kept correctly adjusted.

* In the "Farmer and Settler."



PLATE 96.—VINCA ROSEA, A REPUTED CURE FOR DIABETES.

VINCA ROSEA—A REPUTED CURE FOR DIABETES.

By C. T. WHITE, Government Botanist.

In the "Queensland Agricultural Journal" for February, 1925, I wrote an article on the reputed value of *Vinca rosea* as a cure for diabetes. The article was reprinted or referred to in many newspapers and magazines, with the result that a big correspondence resulted and the available stock of reprints soon became exhausted.

Since the article was written the plant has gained a great deal of favour, and some rather wonderful accounts of its value as a curative agent have been given to me.

It was Mrs. H. N. Uffindell, of Lower Mitcham, South Australia, who first drew my attention to the use, in South Africa, of the herb *Vinca rosea* as a cure for diabetes. Mrs. Uffindell, hearing that the plant was a common weed in Queensland, wrote requesting a supply of leaves, and at the same time enclosed a cutting from a South African paper giving the following directions for the use of the plant.

Vinca Treatment of Diabetes.

Each day boil twenty-seven leaves in three and a-half cups of water for fifteen minutes, then strain. Take one cup after each meal; one hour afterwards as much bicarbonate of soda as can be got on a sixpence in half a glass of warm water. Diet consists of all green vegetables, meat three times a day, game, fowl, or bacon for a change, some apples. Avoid ordinary bread.

In South Africa, Mr. E. E. Whyte, the discoverer of the value of *Vinca* in diabetes, has put up a proprietary medicine termed "Covinea," for which it is claimed that eight out of every ten cases of sugar diabetes will find the use of Insulin and strict dieting unnecessary.

As the plant is a very common weed in Queensland, the following description and accompanying illustration are published for the use of sufferers who may care to make a trial as to the efficacy or otherwise of the plant. It most commonly occurs along sandy beaches, particularly from Maryborough northwards; about Brisbane and more southern localities it is not so common, but may often be seen as a stray from garden culture.

Two varieties or forms occur, the one with pink (the type) and the other with white flowers (var. *alba*); the properties are most probably the same in both.

Description.—A perennial herbaceous plant 1 to 2 ft. high. Leaves arranged in opposite pairs, elliptic in outline, $1\frac{1}{2}$ to $2\frac{1}{2}$ in. long, nearly 1 in. broad tapering at the base to a short stalk of about $\frac{1}{4}$ in. Flowers borne in the uppermost leaf axils; calyx green about $\frac{1}{4}$ in. long divided to about the middle into five narrow lobes; corolla with a slender tube a little over an inch long dividing at the apex into five flat pink or white lobes $1\frac{1}{2}$ in. across; lobes obovate rather lop-sided, much narrower towards the base. Seed capsules in pairs, long and narrow, about $1\frac{1}{4}$ in. long, full of small black oblong seeds, each seed about one line long.

Distribution.—A native of the West Indies and Tropical America, now naturalised in most of the warmer parts of the world.

Common Name.—Species of the genus *Vinca* are commonly known as Periwinkle.

Botanical Name.—*Vinca*, from the Latin *vinculum*, a bond or fetter in allusion to the twining shoots of some species of the genus; *rosea*, Latin referring to the pink colour of the flowers of the type.

Botanical Reference.—*Vinca rosea* Linnaeus, species Plantarum 305.

A GRATEFUL FARMER.

A Marburg farmer writes (5th August, 1927): "As I am a subscriber to the 'Queensland Agricultural Journal,' I take this opportunity of expressing my gratitude to your branch of the Government for the circulation of this valuable book. No farmer should be without it."

CRATE PACKING OF BANANAS.

For some time Mr. William Leslie, Assistant Instructor in Fruit Culture, has interested himself experimentally in the packing and transport of bananas. In replying to an inquiry from a grower who is also engaged in the retail trade on the subject of banana transport in whole bunches, so that they might arrive unblemished at the point of delivery, Mr. Leslie had this to say, *inter alia*:—

CRATING BANANAS.

With reference to inquiry *re* the transport of bananas in whole bunches with a view to their arrival at their destination quite unblemished—viz., minus the usual bruises and discoloration—I have to state as follows:—

(1) Naked bunches of bananas are carried in specially constructed holds of steamers from the West Indies to ports in the British Isles and in America.

(2) Such bananas are almost invariably of the Gros Michel variety, which, owing to its tough skin, is not readily bruised, and is therefore fit for this mode of transport.

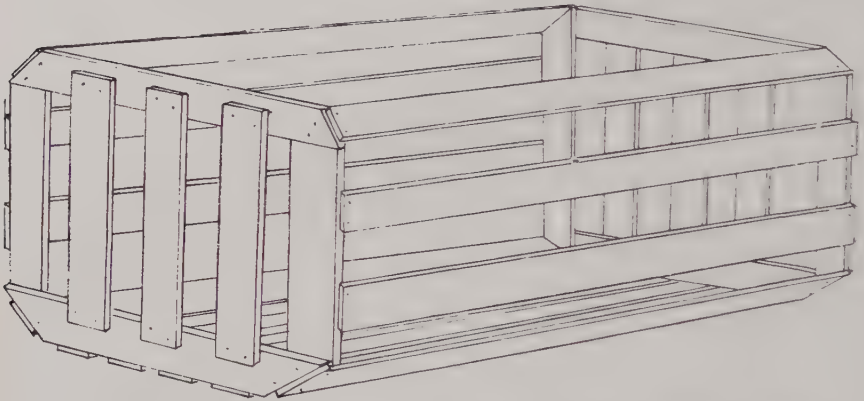


PLATE 97.—DOUBLE BANANA CRATE, AS USED BY CANARY ISLAND SHIPPERS.

16 sides— $\frac{5}{8}$ in. x $2\frac{1}{2}$ in. x 26 in., 28 in., 30 in., 32 in., 34 in., or 36 in.

6 ends— $\frac{1}{4}$ in. x $2\frac{1}{2}$ in. x 14 in.

4 head-pieces— $\frac{5}{8}$ in. x $2\frac{3}{4}$ in. x $2\frac{1}{2}$ in.

4 head-pieces— $\frac{5}{8}$ in. x $1\frac{1}{2}$ in. x $2\frac{1}{2}$ in.

30 pieces to each crate.

(3) As the variety grown in Queensland generally is the Cavendish, which has a soft skin and easily bruised, carrying naked bunches in the above manner would result in considerable loss, and the plan adopted by the growers in the Canary Islands would be more suitable, for there the Cavendish is the common variety grown and the fruit is exported to Britain in specially made crates. I propose, therefore, giving you a description of the method from what I have seen of it in the Canary Islands, also during numerous voyages between the Canaries and Britain by the Elder Dempster line of steamers which convey the fruit. While taking part in the distribution of these bananas in the United Kingdom I observed details which may prove helpful in the present inquiry.

Crates are used and straw or banana trash is used as a lining for the crates, and each high-quality bunch is rolled in a sheet of cotton wool before being packed. The lower qualities are often packed only in the straw and without the cotton wool.

Careful handling of the bunch is requisite at all stages, but bruises are most likely to occur on the plantation previous to placing in the crate.

The bunches should not be laid on their sides nor on their points, but on the stalk end where the stalk is cut, so that it protrudes sufficiently to take the whole weight of the bunch, none of the fingers touching the ground or floor.

Packed in this manner the bananas are carried successfully, not only to distant ports, but also through many handlings and long railway journeys throughout the

United Kingdom. They are generally received by wholesalers who ripen them as required, and the fruit is turned out of the crates with unblemished skin—a beautiful golden yellow and seldom a speck or any discoloration.

I submit, therefore, that such a system of packing merits a fair trial in Queensland, with the prospect of conveying the fruit to Melbourne and other Southern markets, to arrive in superb condition and ripen without a speck.

The Practice in the Canary Islands.

Mr. Leslie also wrote to Elder Dempster (Grand Canary) Limited at Las Palmas, Canary Islands, from whom he received the subjoined interesting reply dated 21st July, 1927:—We are in receipt of your letter of the 26th May, and in reply have to inform you that there are no descriptive pamphlets on the packing of bananas here. We have pleasure, however, in giving you the following information, which we hope

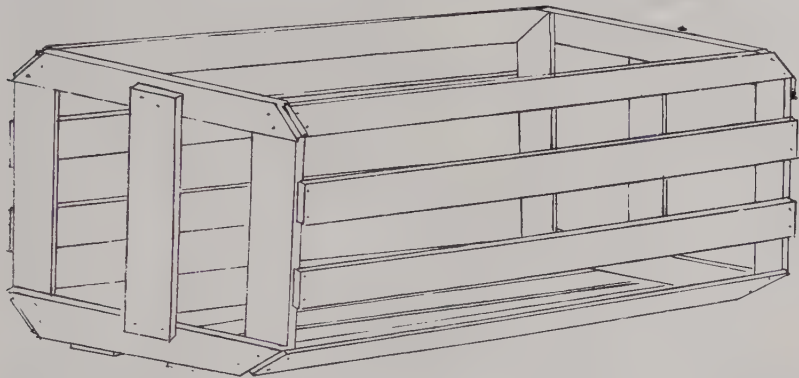


PLATE 98.—SINGLE BANANA CRATE, AS USED BY CANARY ISLAND SHIPPERS.

12 sides— $\frac{5}{8}$ in. \times $2\frac{1}{2}$ in. \times 28 in., 30 in., 32 in., 34 in. or 36 in.

2 ends— $\frac{1}{2}$ in. \times $2\frac{1}{2}$ in. \times 14 in.

8 head-pieces $\frac{5}{8}$ in. \times $1\frac{3}{4}$ in. \times $2\frac{1}{2}$ in.

—
22 pieces to each crate.

will be useful to you:—The bunch of bananas in Canary is first wrapped round with wadding, then wrapped in brown paper, and then packed in the crate, straw (or banana leaves dried) being used for packing in order to keep the bananas well away from the wood. This system of packing is necessary with the Canary banana, which, as you probably know, is very easily bruised. The crates are either “single” or “double”—that is, they contain either one bunch or two bunches of bananas, and the length of the crate varies in accordance with the size of the bunch. We enclose herewith sketches which we have made, together with full particulars of the dimensions, and if we can give you any further information we shall be pleased to do so.

BANANAS IN THE NORTH.

Banana plantations in the Innisfail district are now recovering from the severe weather conditions experienced during last year and the early part of the present year. Fruit is now going forward to the Sydney market in increasing quantities. The quality is not yet of a very high standard owing to the severe set-back the plants suffered during the cyclonic blow in February last. Suckers that have come away since that time, however, give promise of an excellent crop later.

In regard to the packing of their fruit many growers are inclined to over-brand. By that I mean they grade their fruit into three sizes and mark them Special, Choice, and Standard respectively, irrespective of whether the fruit reaches the standard size for the grade or not. Buyers look on fruit so over-branded with suspicion, and will offer a lesser price than they would if it was correctly branded with a lower grade. Even though the three particular grade names are not now compulsory, they have come to be recognised on the market, and growers will be well advised to keep their fruit up to the grade sizes if they use those grade names.—S. E. STEPHENS, Inspector, Diseases in Plants.



Photo.: G. H. Parsons.

PLATE 99.—BRITISH BREEDS OF LIVE STOCK—DAIRY SHORTHORN.
This represents the type embodying the aims of British breeders (reproduced from "Farming," an English publication).



Photo: Sport and General.] PLATE 100.—BRITISH BREEDS OF LIVE STOCK—BRITISH FRIESIAN.
A representation of the type aimed at by British breeders (reproduced from "Farming," an English publication).

CONTAGIOUS MAMMITIS IN CATTLE.

METHOD OF VACCIN TREATMENT.

By C. J. POUND, Government Bacteriologist.

This serious disease is continually being brought under notice through outbreaks occurring on dairy farms, and its spread may be attributed partly to the carelessness of the dairy farmer and partly to the want of proper hygienic methods of controlling it.

The disease is a catarrhal affection, and is limited in most cases to the delicate mucous membrane lining the milk ducts of the mammary gland. As a rule, there is very little heat or swelling; moreover, the affected parts are not particularly painful.

The disease is caused by a tiny chain-forming micro-organism, or streptococcus, which attacks the mucous membrane and, by the development of its poisonous products or toxins, causes a rapid destruction of tissue cells and leucocytes or white blood corpuscles which are attracted to the spot. These dead cells produce that peculiar feature of the disease—a yellowish purulent discharge or pus, which can be withdrawn from the affected quarter.

Symptoms.

In the acute form the first symptoms are a diminution in the milk yield (usually in but one quarter of the udder), a definite acidity of the milk, and a tendency for it to become rapidly coagulated. Gradually the milk assumes a dirty brownish colour and becomes more curdly, the amount of secretion from the affected quarter diminishing owing to the thickening of the milk ducts, which finally become impervious, and the whole quarter is rendered useless. The lesions develop slowly, and first one quarter and then another of the udder becomes involved, and later the milk secretion is liable to stop entirely. It will be observed in some cases that the milk does not appear to be curdled, and on settling the deposit is so very small as to be overlooked.

Methods of Transmission.

Undoubtedly the transmission of the disease from cow to cow is through the agency of the milker's hands or the cups of the milking machine. This appliance, which was designed to enable the farmer to produce cleaner milk than by any other method, must be kept scrupulously clean and be sterilised after each milking by means of repeated washings with boiling water. Before and after each milking of an affected animal the milker's hands and the teats and udder of the cow should be washed with some reliable disinfectant solution, such as Hycol, Kerol, or Cyllin, diluted in the proportion of one part of disinfectant to 250 parts of water—i.e., one teaspoonful to one quart. Care must be taken not to allow any of the cream or milk from a healthy cow or any of the dairy utensils to become tainted with the disinfectant, as the flavour and odour might be detected in the butter. To obviate this, the disinfectant, after being allowed to act for ten minutes, should be washed off with sterilised water—i.e., water that has been just previously boiled and allowed to cool.

Once the disease has appeared in a herd the owner should personally examine minutely every cow's udder before milking, and note carefully the character of the first small quantity of milk drawn. Any cow that shows signs of the disease, or that is in any way suspicious, should be held over to the last for hand milking, and on no account should the cups of the machine be used on her.

Milk from an affected cow must be considered dangerous. The cow should be milked last into a vessel kept specially for the purpose, and the milk scalded so as to destroy the mammitis germs. When it is cooled down it may be fed to the pigs.

Treatment.

Both preventive and curative treatment have been successfully carried out by means of vaccin prepared at the Stock Experiment Station, Yeerongpilly. When used as a preventive the vaccin confers a period of immunity to contagious mammitis which varies considerably in individual animals. In no case, however, is it thought that this period exceeds twelve months.

A stock vaccin may prove useful as a curative, but the best results are usually obtained from the use of an autogenous vaccin—i.e., one prepared from the particular strain of germ affecting the animals it is proposed to treat. To prepare such a vaccin it would be necessary for the Government Bacteriologist, Stock Experiment Station, Yeerongpilly, to receive about 1 oz. of strippings from the affected quarter of a cow, in a clean bottle with no preservative added. A few days are required to prepare the vaccin, which will remain potent for about six months.

The vaccin is injected into the loose subcutaneous tissue behind the shoulder in the same manner as tick fever inoculation is performed, and the ordinary tick fever inoculating syringe and needle are necessary to do the work.

The full dose of vaccin in ordinary cases is 4 c.c., injected in two doses of 2 c.c. each, with a forty-eight-hour interval between the injections. Two injections of 2 c.c. will usually effect a cure, but in cases of long standing it might sometimes be found necessary to continue the treatment. Before the injections are commenced, the syringe and needle, after loosening the parts, should be sterilised by boiling in water for ten minutes, and the skin of the animal at the proposed site of injection should be treated with a solution of Hycol, Kerol, or Cyllin for ten minutes.

CONTAGIOUS MAMMITIS VACCIN—SCALE OF CHARGES.

No. of Animals.							Charge.	
							s.	d.
1	..	..	..	..	..	..	2	6
5	..	..	..	..	..	..	6	3
10	..	..	..	..	..	..	10	0
20	..	..	..	..	..	..	16	8
40	..	..	..	..	..	..	30	0
60	..	..	..	..	..	..	40	0
80	..	..	..	..	..	..	46	8
100	..	..	..	..	..	..	50	0

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF AUGUST, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING AUGUST, 1927 AND 1926, FOR COMPARISON.

Divisions and Stations.		AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.		AVERAGE RAINFALL.		TOTAL RAINFALL.	
		Aug.	No. of Years' Records.	Aug., 1927.	Aug., 1926.			Aug.	No. of Years' Records.	Aug., 1927.	Aug., 1926.
<i>North Coast.</i>						<i>South Coast—continued:</i>					
		In.		In.	In.			In.		In.	In.
Atherton ...	...	0·86	26	0·12	0·65	Nambour ...	...	1·97	31	0·07	0·10
Cairns ...	...	1·80	45	0·15	1·65	Nanango ...	...	1·41	45	0·20	0·26
Cardwell ...	...	1·32	55	0·03	1·45	Rockhampton ...	...	1·01	40	0·72	0·08
Cooktown ...	...	1·34	51	0·35	0·50	Woodford ...	...	1·81	40	0·32	0·18
Herberton ...	...	0·67	40	0·07	0·31						
Ingham ...	...	1·57	35	0·23	1·80	<i>Darling Downs.</i>					
Innisfail ...	...	5·24	46	0·19	5·40	Dalby ...	...	1·26	57	0·65	0·29
Mossman ...	...	1·46	14	0·10	0·90	Emu Vale ...	...	1·24	31	0·19	0·33
Townsville ...	...	0·55	56	0	0·02	Jimbour ...	...	1·27	39	0·15	0·13
<i>Central Coast.</i>						Miles ...	...	1·22	42	0·20	0·44
Ayr ...	...	0·64	40	0	0	Stanthorpe ...	...	1·88	54	0·33	1·45
Bowen ...	...	0·70	56	0	0·07	Toowoomba ...	...	1·74	55	0·45	0·35
Charlton Towers ...	...	0·61	45	0	0	Warwick ...	...	1·57	62	0·19	0·41
Mackay ...	...	1·10	56	0·45	0·18	<i>Maranoa.</i>					
Proserpine ...	...	1·48	24	0·05	0·46	Roma ...	...	1·00	53	0·12	0·08
St. Lawrence ...	...	0·90	56	0·12	0	<i>State Farms, &c.</i>					
<i>South Coast.</i>						Bungewongorai ...	...	1·11	12	0·18	0·01
Biggenden ...	...	1·12	28	0·53	0·12	Gatton College ...	...	1·27	27	0·28	0·49
Bundaberg ...	...	1·32	44	1·26	0	Gindie ...	...	0·79	27	0·7	0
Brisbane ...	...	2·08	76	0·27	0·41	Hermitage ...	...	1·48	20	0·22	0·28
Caboolture ...	...	1·61	40	0·20	0·72	Kairi ...	...	1·05	12	0	0·59
Childers ...	...	1·25	32	1·04	0	Sugar Experiment Station, Mackay	...	1·04	29	0·18	0·28
Crohamhurst ...	...	2·24	35	0·15	0·14	Warren ...	...	0·99	12	0·81	0
Esk ...	...	1·59	40	0·30	0·93						
Gayndah ...	...	1·21	55	0·60	0·06						
Gympie ...	...	1·79	57	1·42	0						
Kilkivan ...	...	1·50	48	0·23	0·10						
Maryborough ...	...	1·72	55	0·86	0·04						

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for August, this year, and for the same period of 1926, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, Divisional Meteorologist.

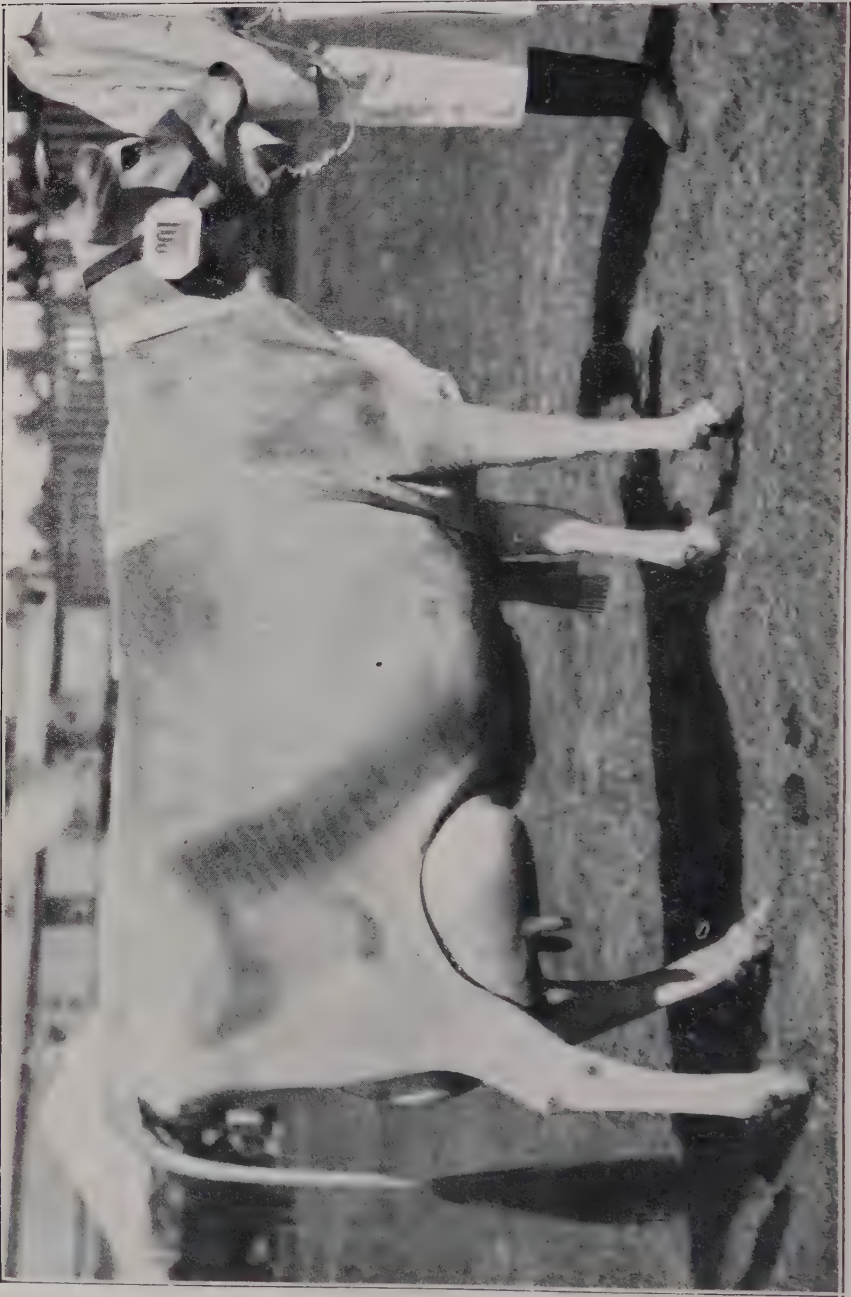


Photo.: "Live Stock Bulletin."

PLATE 101.—"OXFORD GOLDEN BUTTERCUP" (2387), BY "PRINCE PALATINE" (IMP.) (760), DAM "AUDAX BUTTERCUP" (829).

First prize Jersey Cow, four years old and over, dry; first for Australian bred cow; first in Breeders', Exhibitors', and Sires' Progeny Stakes groups; and Champion Jersey Cow for the fourth year in succession. Official Records: 8,997 lb. milk 460-64 lb. fat in 273 days; and 2-285 lb. of butter in twenty-four hours. Bred and exhibited by Messrs F. Burton



Photo: "Live Stock Bulletin."

PLATE 102.—"TRINITY CORAL" (3357), BY "LORD ETTREY OF BANYULE" (1277), DAM "TRINITY BLUEBELL" (2590).

Second prize Jersey Cow, five years old and over, in milk; second in Sires' Progeny Group; second in Exhibitors' Group; and third in Sires' Progeny Stakes Group. She was first as a four year old at last year's Royal. Bred by and the property of J. Simamon, Trinity Jersey Stud, Goodna, Queensland.

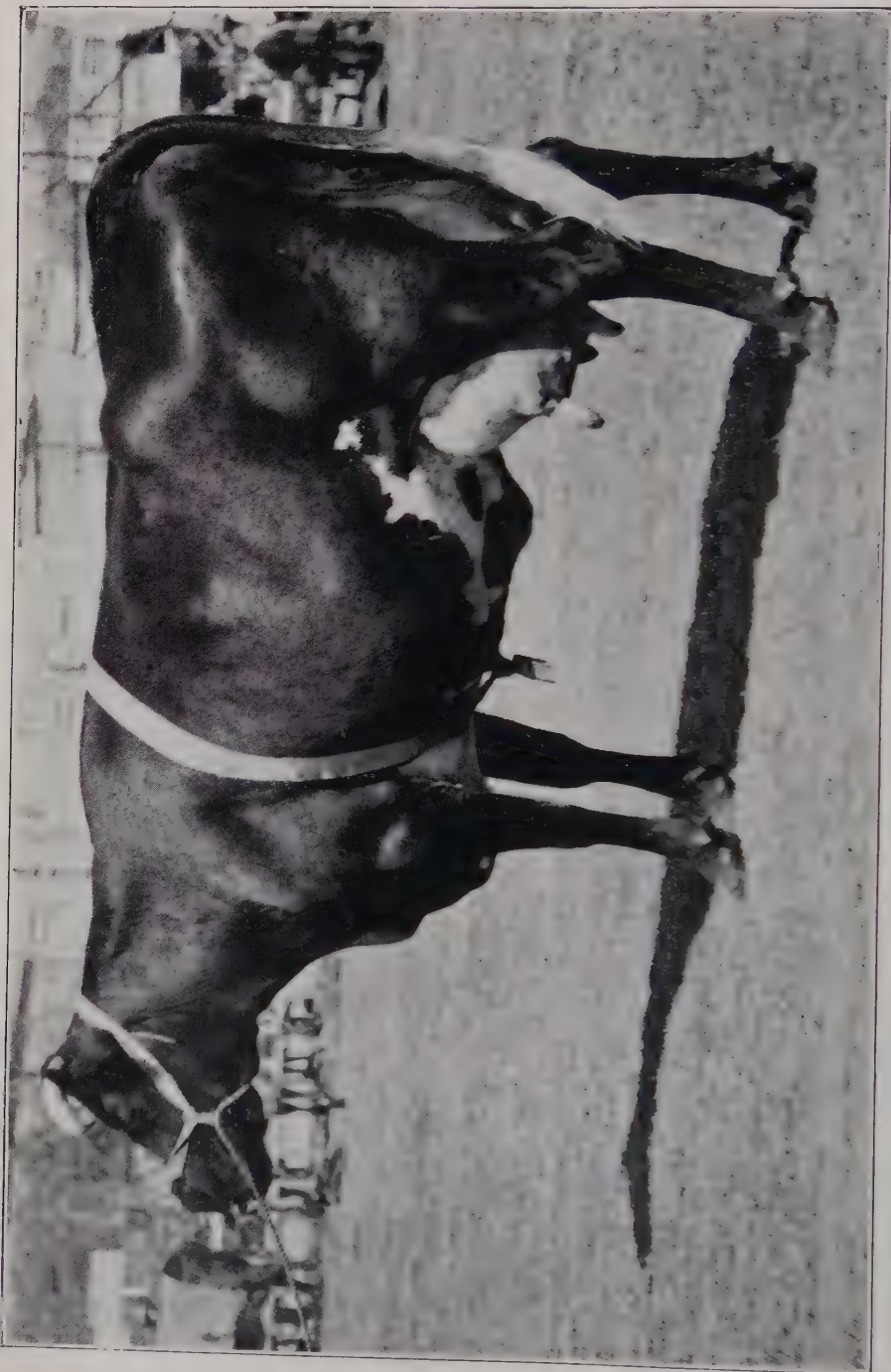


Photo. : "Live Stock Bulletin."

PLATE 103.—"ROSIE 4th OF GREYLEIGH" (152), BY "JOFFRE OF GREYLEIGH," DAM "ROSIE 3rd OF GREYLEIGH" (263).

First Prize I.M.S. Cow, five years old and over, in milk; first in Pen of Three Cows, over three years; second against all breeds for greatest Daily Yield of Butter-fat for 48 hours, with 25042 lb.; second for Largest Supply of Milk in 48 hours with 138.8 lb.; and Champion I.M.S. Cow for the second year in succession. Exhibited by and the property of A. J. Carswell, Dnalwon, Wangalpong Queensland.



Photo.: "Live Stock Bulletin."

PLATE 104.—"OAKLEA SEGIS COLANTHA" (776), BY "OAKLEA KING SEGIS" (N.Z. 831), DAM "COLANTHA SOLKYE WIEMAN" (994).

First prize Cow, four years old and over, dry; first in Ex'h'itors' Group; and Champion Friesian cow. Exhibited by and the property of E. J. Wecker, Tingioora, Queensland.

MILK IN THE HOME.

ITS AFTER TREATMENT BY CONSUMERS.

By C. J. POUND, Government Bacteriologist.*

The proper care of milk after it has been delivered to the consumer is a matter of great importance. It is desirable to have it in the best possible condition for use, and it is not desirable to blame the milkman for things for which he is not in the least responsible.

If the milk is kept in an open vessel in a refrigerator or ice chest with meats and various kinds of vegetables and fruit, it will absorb odours from them. It is also sensitive to flavours, and if allowed to stand in an old billy-can, the "tin taste" can be easily recognised. Milk should therefore be kept in a cool place free from odours and in a perfectly clean vessel of suitable material. A well-glazed earthen or porcelain jug, or an iron enamelled billy—in fact, a glass jar or bottle—are the best retainers, as with the use of a bottle brush, soap, and warm water they can be thoroughly cleansed. A tin billy is good, but only so long as the iron is well covered.

When milk is served soon after milking, in many cases it is not cooled by artificial means, and is supplied by dairymen who drive in twice each day delivering it as "warm from the cow." To many persons this is a guarantee of its purity, but milk served in this way will sour in a short time. During the summer months, within two or three hours after it is delivered, it is likely to be nearer a condition of sourness than milk twelve or twenty hours older which was cooled immediately after milking and kept at a low temperature.

Changes in Milk.

Pure as milk may be in its natural state, it is a perishable product, and although with a proper knowledge of its peculiarities and care in its keeping it can be held in a wholesome state a reasonable length of time, there are natural changes which are sure to occur as soon as opportunity is given. Thunderstorms, impurities, warm temperature, and other conditions known to exist when milk is most liable to give trouble, have been blamed for its changes; but it is now known that these are only indirect causes, and that changes in milk which bother the housekeeper are due to and cannot possibly take place without the presence of those minute organisms called bacteria.

It is extraordinary how strongly many people still adhere to the theory that thunder causes the souring of milk. The condition—the extra-heated atmosphere—which causes the thunder is also the same condition which facilitates the growth of lactic acid bacilli and the consequent souring of milk. No better proof that thunder does not cause this trouble is the fact that all the tubes and flasks of sterilised milk in our laboratory at Yeerongpilly remain unaltered through all the hot weather when thunderstorms are prevalent.

It has been demonstrated that by sterilising the milker's hands and the teats of the cow, milk free from bacteria can be drawn into a sterilised bottle, will undergo no change and remain perfectly sweet indefinitely. It is, of course, impossible to draw milk from the cow in such a manner that it will be free from bacteria except by the use of precautions absolutely impracticable in ordinary dairying. As milk is commonly drawn it is sure to be contaminated by bacteria, and by the time it has entered the bucket it contains frequently as many as half a million bacteria in every cubic inch of the milk. This seems almost incredible, but it has been demonstrated in many cases and it is beyond question.

Since these bacteria are not in the secreted milk they must come from some external sources. The first of importance is the cow herself; for while her milk when secreted is sterile, and while there are no bacteria in her blood, nevertheless the cow is the most prolific source of bacterial contamination. After each milking a little milk is always left in the ducts, and these furnish ideal places for bacteria to grow. Some bacteria from the air or elsewhere are sure to get into these ducts after the milking, and they begin at once to multiply rapidly. By the next milking they become very abundant in the ducts, and the first milk drawn washes most of them at once into the milk pail, where they continue their growth in the milk. Again, the exterior of the cow's body contains them in abundance. Every hair, every particle of dirt, every bit of dried manure, is a lurking place for millions of bacteria. The hindquarters of a cow are only too frequently in an uncleanly condition, for the farmer rarely grooms his cow, and during the milking, by her movements, by the switching of her tail and by the rubbing

* In a lecture delivered from the Queensland Radio Station, 4QG, Brisbane.



Photo: "Live Stock Bulletin."]

PLATE 105.—"ROYAL GEORGE 2nd OF NESTLES" (288), BY "ROYAL GEORGE OF NESTLES" (50), DAM "NECKLACE OF TALGAI" (171).

First Prize I.M.S. Bull, four years old and over, and Champion I.M.S. Bull. Last year he was Reserve Champion at the Brisbane Royal, and in 1923 he was Champion of Queensland. Bred and exhibited by the Nestle and Anglo Swiss Condensed Milk Co., Toogoolawah, Queensland.

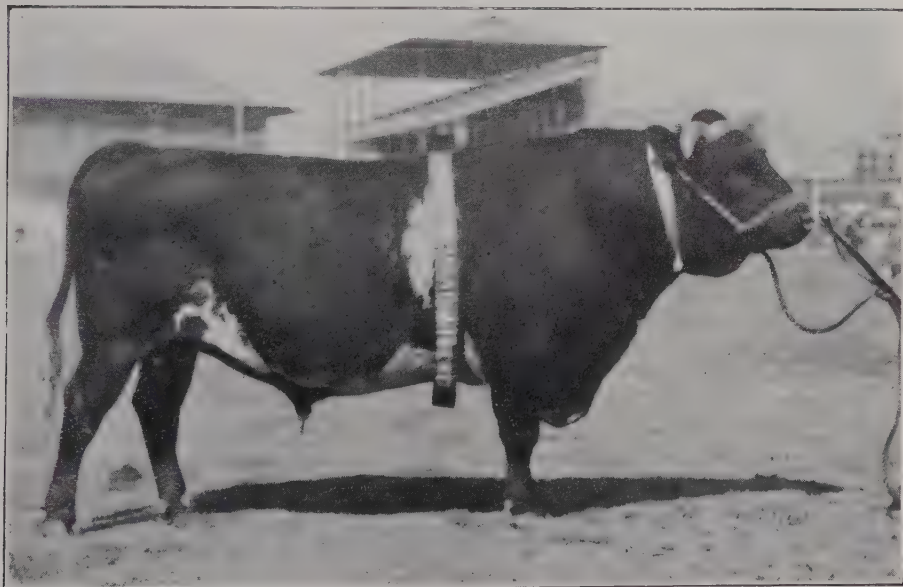


Photo.: "Live Stock Bulletin."

PLATE 106.—"CHARM'S DUHALOW OF OAKVALE," BY "GEM'S PLUM OF HILLVIEW," DAM "CHARM OF GLENTHORNE."

Second Prize I.M.S. Bull, four years old and over; first or Sire and his Progeny; first in Exhibitors' Group; second in Sires' Progeny Stakes; and Reserve Champion I.M.S. Bull. Bred and exhibited by Mr. B. O'Connor, Oakvale, Colinton, Queensland.

she gets from the milker, no inconsiderable amount of this dirt and filth, including all kinds of deleterious micro-organisms, are brushed off and fall into the milk pail. The farmer understands this source of dirt, and usually feels it necessary to strain the milk after milking. But the straining it receives through a coarse cloth, while it will remove the coarser particles of dirt, has no effect upon the bacteria, for when one remembers many of them are only the one fifty-thousandth of an inch in diameter, they can readily pass through any strainer unimpeded. Again, the milk vessels themselves contain bacteria for they are never washed absolutely clean. After the most thorough washing which the milk pail receives from the kitchen, there will always be left many bacteria clinging to the cracks of the tin ready to begin to grow as soon as the milk once more fills the pail.

The milker himself contributes to the supply, for he goes to the milking with often unclean hands, unclean clothes, and not a few bacteria get from him to his milk pail. We also find the air of the milking stall furnishing its quota of milk bacteria, especially if the cattle are allowed to feed upon dusty hay or chaff before or during the milking. Last but not least we must not forget the direct contamination of the various dairying utensils by the ubiquitous fly.



Photo.: "Live Stock Bulletin."

PLATE 107.—"TRINITY DARBY" (1720), BY "LORD ETTREY OF BANYULE" (1277),
DAM "FERN'S CRYSTAL" (IMP.) (1332).

First prize Jersey Bull, four years old and over, and Champion Jersey Bull of Queensland. Bred by J. Sinnamon, Trinity Jersey Stud, Goodna, Queensland, and owned by W. W. Mallett, Nambour, Queensland.

this entomological muck raker using as its breeding places the insanitary manure and garbage heaps to be found in the vicinity of the milking shed and dairy of many farms. We thus see how readily milk may become contaminated before it reaches the consumer.

The results of carefully conducted experiments indicate that it is possible for the average dairy farmer, without expensive equipment, to produce milk (practically free from visible dirt) which when fresh has a low bacterial count. By the use of the three simple factors—viz., sterilised utensils, clean cows with clean udders and teats, and the small top pail—it should be possible on the average farm to produce milk which corresponds closely to the milk as it leaves the udder of the cow. A fourth factor of holding the milk at near 50 deg. Fahr. as possible is also absolutely necessary to ensure its keeping fresh for a reasonable time.

In the absence of any improved conditions on the part of the dairy farmer, it must be obvious to everyone that all milk which affords such an excellent food for the growth of bacteria, particularly those that cause souring, must reach the consumer in a changing condition which may be gradual or rapid, depending entirely upon the surrounding temperature.

We all know that during the cold weather milk will keep and taste quite sweet for two days or longer, while during the hot summer days milk will soon taste sour and become curdled in a few hours after being received from the milkman.

The change to which milk is most liable is simple souring. The best agents to prevent this change are cold or heat. There should be no trouble in keeping milk sweet at a temperature of 50 deg. Fahr. after it is in the hands of the customer. This can be done if it is delivered in good condition, and properly handled after delivery.

It is the custom in some places to leave the milk in an open vessel on the doorstep early in the morning, and it remains there exposed to heat, dust, and insects, until wanted in the house. This is a dangerous practice. Too much care cannot be used in seeing that the milk is cold when delivered, and that it is then immediately put in a cool place. If allowed to stand in the warm air, it



Photo.: "Live Stock Bulletin."

PLATE 108.—"CARNATION BUTTERFLY" (3598), BY "CARNATION PRINCE" (1055), DAM "CARNATION BUTTERCUP" (1958).

First prize, Jersey Cow, four years old and under five, in milk; third for Australian bred cow or heifer; first in Group of Sire and Three of his Progeny; second in Breeders' Group; third in Exhibitors' Group; second in Sires' Progeny Stakes; and Reserve Champion Jersey Cow, bred and exhibited by W. Spreser, Brassall, via Ipswich, Queensland,

will only remain sweet for a little time. Sometimes milk does not keep sweet when no cause can be discovered for its souring. This is frequently the case in summer. Often the trouble is the refrigerator or ice chest, which may seem cold on account of the great difference between its temperature and that outside, while it is in fact not cold, and a thermometer may show its temperature to be even above 60 deg. Fahr.

We cannot expect to have good milk of safe quality without a realisation on the part of the farmer, dairyman retailer, and the housewife of the danger in utilising warm or dirty milk. Education is therefore an important factor

in the improvement of the milk supply, which cannot be accomplished by laws and regulations alone. In view of these facts it is recommended that the subject be taught in the schools, that popular articles be prepared for the Press, that lectures and demonstrations be given in towns and all dairy-farming centres, and especially that rules and suggestions with reasons therefore be placed in the homes of dairymen and dairy attendants.

The importance of obtaining a hygienic and wholesome milk supply is recognised by all intelligent people and should require no argument. Next to bread, milk is more extensively used as an article of diet than any other foodstuff. It forms a portion of the food of almost every person on practically every day in the year. Moreover, unlike many other articles of diet, milk is consumed in most cases in an uncooked state, making it a very dangerous food should it perchance contain any deleterious germs. Therefore, under our present imperfect system of milk supply, it is recommended that all milk as soon as delivered to the consumer be subjected to pasteurisation.

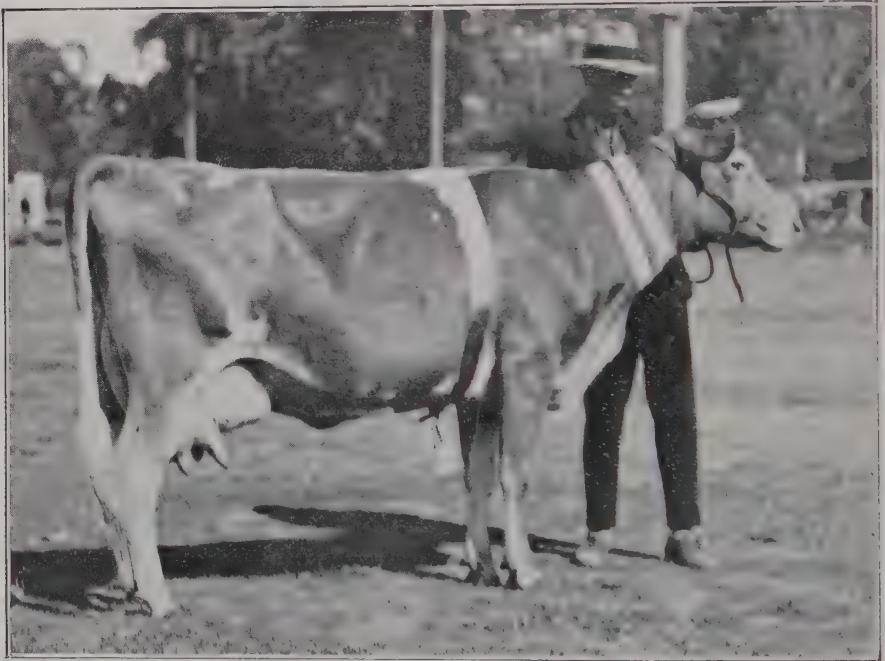


Photo.: "Live Stock Bulletin."

PLATE 109.—"MINNAMURRA CHERUBINE" (948), BY "MINNAMURRA LADDIE" (198), DAM "MINNAMURRA DUCHESS" (506).

First Prize Guernsey Cow, three years old and over, dry; First in Exhibitors' Group; and Champion Guernsey Cow of Queensland for the third year in succession. She put up 149 lb fat in 24 hours as a heifer. The property of Mr. Alan Cooke, Maleny, Queensland.

Theoretically pasteurisation should not be necessary; practically we find it forced upon us. The heating has certain minor disadvantages, but it is an efficient safeguard. The advantages of pasteurisation are that it not only enhances the keeping properties of the milk, but it is a cheap and effective means of preventing the transmission of infectious diseases such as tuberculosis, typhoid fever, diphtheria, scarlet fever, commonly spread by milk. It also has a favourable influence in preventing or ameliorating the severity of some of the intestinal disorders of children caused by impure milk.

The pasteurisation of milk in the home is an easy operation, and mothers and nurses should know how to do it, as the necessity may arise at any time. The treatment consists in heating the milk to a temperature usually between 140 deg. and 160 deg. Fahr., at which large numbers of bacteria including those

causing the diseases previously mentioned are killed, and then cooling it to check the growth of others. In a domestic way this is best accomplished by heating the milk in a jug or preferably an enamelled billy with a lid placed in an outer vessel containing water which is brought up to boiling temperature, 212 deg. Fahr., and kept at that temperature for about fifteen minutes, while the temperature of the milk in the inner vessel will not rise above 170 deg. Fahr. It is then placed in another vessel of running cold water to cool rapidly, and afterwards kept in an ice chest or some cool place until required for use. Unless the weather be exceptionally warm such treated milk will remain perfectly sweet for twenty-four to thirty-six hours. If not required for immediate use the milk should remain in the vessel in which it was heated.

The following very simple device has the advantage of being within reach of any common household and obviates the possibility of the milk being overheated or the water in the outer vessel evaporating altogether through the person in charge being unavoidably called away:—



Photo.: "Live Stock Bulletin."

PLATE 110.—"MOOROOMBIN MAUD" (1343), BY "PABST ARROWHEAD" (IMP.) (204), DAM "MAUD ROOKER KORNDYKE" (IMP.) (589).

Second prize Friesian Cow, four years old and over, dry; and Reserve Champion Friesian Cow. Official records: 50½ lb. milk, 1-778 lb. fat in 24 hours, and 11-097 lb. milk and 488 217 lb. fat in 273 days as a two year old. Bred and exhibited by Messrs. Brown Bros., Mooroombin, Toogoolawah, Queensland.

The vessel containing the milk is placed in a pail filled just above the level of the milk with boiling water. If allowed to stand for half an hour and then cooled the milk is practically pasteurised.

We all prefer pure milk, but so long as we cannot obtain it we must purify what we get, and pasteurisation is a cheap and efficient method of accomplishing this result.

The up-to-date idea of broadcasting from 4QG reliable information on agricultural matters, including milk hygiene, must meet with general approval; but to make the scheme the success it should be, something further must be done by way of encouraging the farmer and the members of the family to install in the home an inexpensive reliable receiving set.

THE PROBLEM OF THE TUBERCULOUS COW.

By ARTHUR GOFTON, F.R.C.V.S., Chief Veterinary Inspector, Edinburgh.*

Primarily, this Conference is concerned with Public Health questions, but it is not sufficient to consider the tuberculosis problem from the public health standpoint alone. To the economic side too little attention has been directed; it has been almost lost to sight in the greater prominence which has been given to the influence of the bovine disease on human health. The facts in connection with the latter are so well known that repetition would be superfluous. I do not propose, therefore, to do more than quote Dr. Stanley Griffith's figures as to the prevalence of the bovine disease in the human subject. His figures are chosen because there are no others which are more representative or which cover such a wide field. Further, Dr. Griffith's record of work in connection with tuberculosis enables him to speak with an authority which cannot be challenged. In Vol. XXIII. (1920) of the "Journal of Pathology and Bacteriology," Griffith reports that in an unselected series of 1,068 cases of human tuberculosis investigated in this country by identical methods, 20.7 per cent. were attributable to bovine infection. Examination of the figures shows an incidence of 37.55 per cent. of bovine disease in children under five years of age, with progressive diminution to 6.25 per cent. from sixteen years of age upwards.

From the point of view of animal health, there is no disease of cattle of even approximately equal importance in this country and none which is responsible to anything like the same extent for loss to the stockowner and to the community. At first thought there may be a temptation to question the truth of the latter statement in view of the large bills which the nation has lately been called on to pay as the cost of eradicating foot-and-mouth disease. But it will be realised on consideration that, over a period of thirty years, foot-and-mouth disease was quite negligible in its economic effects in this country apart from the altogether abnormal experience of the years 1922 to 1924. In any case, it is not possible to arrive at any comparable figure in respect of tuberculosis because, whilst the cost of foot-and-mouth disease is borne, for the major part, by the nation, and can thus be expressed in cash values, the loss from tuberculosis falls on a multitude of individuals, and no means exist whereby the necessary information can be collected and collated. Some facts, based on experience in Edinburgh abattoirs, will, however, be given in order to show the economic influence of bovine tuberculosis in comparison with all other diseases of cattle when considered collectively. It is further to be remembered that bovine tuberculosis continued to exercise its influence without modification year after year and, so long as the present policy of almost complete inaction remains in operation, bovine tuberculosis will continue to be responsible for a consistently recurring animal loss to the community.

During the three-year period, 1921-1923, the records of the Edinburgh abattoir show that tuberculosis was responsible for 82.35 per cent. (by weight) of carcasses condemned, 88.13 per cent. of heads and 44.12 per cent. of edible offal. With the exception of offal, which is of relatively small value, it will be observed that the whole of the non-tuberculous diseases (including traumatism) account for only a comparatively small fraction of the total condemnations. In an article published in "The Milk Industry," for March, 1924, I venture to make an estimate of the actual cost of tuberculosis as represented by slaughterhouse condemnations in the city. Taking a very low average of the prices current in the local dead meat markets during the year 1923, the sum of £5,000 was arrived at as the annual total. Edinburgh is only one meat-consuming centre and by no means the largest. There is no reason to suppose that the experience of Edinburgh differs in any material respect from experience elsewhere. It will be readily appreciated, therefore, that if the slaughterhouse condemnations on account of tuberculosis throughout the whole of Great Britain be taken into account, they represent an annual loss of very considerable magnitude.

It must not be forgotten that slaughterhouse experience is only part of the picture. The tuberculous animal is often slow and costly to feed. When ultimately sold in the fat stock market, loss rather than profit too frequently results. Many dairy cows are disposed of prematurely on account of tuberculosis during their most productive age period and entail a definite loss to the dairy. And there are the numerous miserable unfortunate piners which never reach an abattoir, but whose career is prematurely terminated at the knackery or by burial.

Sufficient has probably been said to make it clear that the economic aspect of the tuberculosis problem is only one degree less important, in the national interest, than the influence of the disease on human health.

* Presented to a recent conference of Veterinary Inspectors held in connection with a recent Royal Sanitary Institute Congress, Edinburgh, and reprinted from "The Veterinary Record" (London).

An effort to arrive at an estimate of the numbers of tuberculous animals which constitute an active danger to human health will perhaps serve a useful purpose. It is scarcely necessary to say that, in this connection, meat, in comparison with milk is relatively negligible as a medium of infection for man. The reasons which justify this statement have been so often expressed, and they are so obvious, that repetition is unnecessary.

Published records of the incidence of tuberculosis in Great Britain are relatively few and, in most cases, they do not embrace a large number of animals. It is, however, generally estimated that 40 per cent. of all dairy stock are affected with tuberculosis and, taking cows of all ages into consideration, this figure is approximately correct. When the majority of the animals under consideration are of mature years, that is to say over five or six years, this figure is almost constantly exceeded. Thus, in Edinburgh during the five-year period, 1920-1924, 16,249 cows passed through the abattoirs and, of these, 7,277 or 44.78 per cent. were shown to be affected with tuberculosis.

Tuberculous infection of milk is attributable mainly to cows which fall into two categories—namely, (1) those with tuberculous mastitis, and (2) those with acute, actively progressive tuberculosis accompanied by rapid loss of condition. In addition, the emaciated tuberculous cow and a very small number of cows, which, though affected with tuberculosis, show no clinical manifestations of the disease, are known sometimes, but not constantly, to eliminate tubercle bacilli in the milk. It might be said with truth that every tuberculous cow is a potential disseminator of infection to man through the agency of the milk, but, in fact, the numbers which are actually responsible for human infection by this channel represent a relatively small proportion of the whole.

As to the number of cows affected with tuberculous mastitis, 0.77 per cent. (1 in 142) of the cows slaughtered in Edinburgh abattoirs during the five-year period, 1920-1924, showed macroscopically recognisable lesions. This percentage has varied within very narrow limits from year to year and, as it represents the result of the post-mortem examination of the udder of 16,249 cows, it may be accepted as a fairly accurate indication of the prevalence of tuberculous mastitis. In passing, it is perhaps desirable to state that tuberculous mastitis should not be regarded as necessarily constituting evidence of fairly advanced tuberculosis or of tuberculosis which has become generalised by blood stream infection or otherwise. Our experience in Edinburgh slaughter-house is to the effect that tuberculosis is generalised in 48.2 per cent. of the cows affected with tuberculous mastitis. In the balance of approximately one half, evidence of blood stream infection is absent and the disease is localised in character. Indeed, it is not uncommon to find a tuberculous mastitis in association with a very limited distribution of tuberculosis in the carcass and viscera.

It is quite possible that a sense of alarm, which would not be justified, might be created if the figures were quoted showing the number of cows totally condemned on account of generalised tuberculosis, i.e., tuberculosis in which post-mortem disclosed evidence of blood stream infections or in which, in the absence of blood stream infection, the disease was widely distributed throughout the carcass and viscera. Our slaughter-house records do not differentiate sufficiently between the different types of case which led to total condemnation, to permit selection of those animals in which danger through the agency of milk arose, and those in which it did not occur, or was at least highly improbable. If, however, one might venture, without undue indiscretion, to make an estimate, based on one's personal experience, of the number of dangerous cows, including those affected with tuberculosis of the udder, it would seem probable that the number falls somewhere between 1 and 2 per cent.

From the public health point of view, it is more important to realise that the distribution of the dangerous cows is by no means uniform. Concentrated infection and frequently recurring infection are well known in relation to supplies drawn from herds in which the disease is very prevalent. It would be easy to quote specific instances in illustration of this statement. Further, it cannot be assumed that, because a supply is drawn from a large herd, infection, if it occurs in the milk, will be so diluted by admixture with non-infected milk as to be almost negligible in its effects. It is not a universal practice to bulk the milk from a whole herd. On the contrary, it is quite common to find with a large herd that the milk in any individual container as prepared for distribution is representative of, at most, half a dozen cows. So that the position in regard to infection is frequently the same whether the herd be large or small.

In any campaign directed against bovine tuberculosis attention must, in the first instance, be concentrated on those animals which are a source of human infection. The Tuberculosis Order of the Ministry of Agriculture which has been

promised to become operative coincidently with the Milk and Dairies Acts on the 1st September of the current year, will, without doubt, resemble its predecessor of 1914 in that it will confer power to control the movement and to ensure the slaughter of such animals. It should, however, be clearly recognised that the Tuberculosis Orders of 1913 and 1914 were in reality public health measures and were not primarily intended to control or to eradicate bovine tuberculosis. Unless the new Tuberculosis Order is more ambitious than its predecessors, which seems unlikely, it will certainly not eradicate bovine tuberculosis, nor can it be expected to reduce the incidence of the disease to any material extent. It will only contribute to the latter result in so far as it ensures the removal and destruction of those animals which are most active distributors of the seeds of infection amongst their fellows. The number of animals found to fall within the scope of the Order will, no doubt, be greatest in the first few years of its operation, but it will not prevent a recurring, though perhaps smaller, crop of these animals year after year. It must, however, be acknowledged that a Tuberculosis Order on the lines of that operating in 1914 represents a first and essential step in any scheme for the control of bovine tuberculosis.

The Milk and Dairies Acts provide, *inter alia*, for regular periodical clinical inspection of dairy cattle. In addition, the Scottish Act requires notification to the local authority by the cowkeeper of any cow in his possession which is suffering from any disease liable to infect or contaminate the milk, or any cow which, to his knowledge, is giving tuberculous milk. Provided, therefore, that the Acts are uniformly administered, particularly in the rural areas, the machinery for the early detection and recognition of the dangerous tuberculous cow, and for her effective and permanent removal from dairy stock under the Tuberculosis Order, will become operative in September, and a move forward of very material value in the interests of public health will have been made.

Whilst the Acts and the Order will, it may be reasonably be expected, go a long way to minimise the danger of tuberculous infection from milk, they will not wholly remove it. Further, they leave the economic side of the tuberculosis problem almost untouched. They, nevertheless, represent as much as could reasonably be undertaken as a first step in legislation on the subject. Both for economic and public health reasons the ultimate aim should be the complete eradication of tuberculosis from dairy stock, but before any material progress can be made in this respect the interest of stockowners must be awakened and their co-operation secured. The Milk (Special Designations) Orders and the long overdue official recognition which they have given to milk which is the produce of tubercle-free herds, have proved a stimulus in the right direction and, in addition, the public demand for such milk, which is the direct sequel of the Orders, has contributed to a definite, if slowly growing, movement amongst stockowners towards the complete eradication of tuberculosis from individual herds.

In the United States of America the movement in this direction is widespread and it is worthy of note that it was initiated at the instigation of a committee composed of breeders and members of the Livestock Sanitary Association. This committee, in 1918, passed resolutions for the purpose of accrediting herds which were tuberculosis-free, that is to say, herds in which no animal affected with tuberculosis had been found upon two annual or three semi-annual tests with tuberculin by the subcutaneous or other approved method and by a thorough physical examination. Some little time after the movement was initiated, the Purebred Breeders' Association demanded that in accredited herd work the test should be of an official nature and should be made by a veterinary officer of the Bureau of Animal Industry or a regularly employed State veterinarian, and the work of tuberculosis eradication has since then been carried out by the bureau in co-operation with the various States. In December, 1923, five years after the initiation of the movement, the official summary of the work, issued by the bureau showed a total of 35,895 accredited herds comprising 758,376 head of cattle, and 422,648 herds comprising 3,690,080 cattle "once tested free." The progress made in the short period is thus both remarkable and rapid, but the real weight of the movement behind the work of tuberculosis eradication in the U.S.A. is even more strikingly illustrated by the figures showing the total number of herds under supervision. The official statement shows that as at December, 1923, 580,986 herds comprising 5,909,377 cattle were under official supervision in connection with the work of tuberculosis eradication, and in addition there was a waiting list of 201,379 herds containing 2,170,247 cattle.

In Canada, a similar movement, under Government control and direction, is on foot in selected and restricted areas, and considerable progress has been recorded. But in Great Britain, neither the States nor the Canadian procedure is practicable at the present time, and if the problem of eradication is to be tackled, it must be

approached more gradually. I do not propose to enter into a discussion of the methods by which the problem may be approached. This, in itself, would provide ample material for a separate paper and discussion. I would, however, make reference to a procedure recently put into experimental operation somewhat widely in this country.

In 1920, Calmette and Guerin described a method of vaccinating calves and young stock against tuberculosis which gives promise of very material aid in the solution of the tuberculosis problem. The procedure consists in the inoculation of calves within a short time of birth with living cultures of tubercle bacilli, the virulence of which has been reduced as the result of prolonged subculturing on media containing bile and glycerine. In the original experiments, vaccinated calves were housed over a period of thirty-four months with clinically tuberculous cows under conditions which favoured natural infection. The experiments clearly proved that the vaccinated calves acquired a high degree of immunity against infection. The vaccine is now available in this country, subject to conditions which will permit of test as to its practical value under farm conditions. Necessarily some time must elapse before this can be determined, but it can, with all confidence, be said that the vaccine offers greater possibilities of general applicability than any of its predecessors.

THE PROBLEMS OF THE MOTORIST.

THE TRANSMISSION SYSTEM.

The petrol engine, unlike the steam engine, has, what is known by engineers, as, a "constant torque" characteristic. That is to say, the petrol engine exerts the same twisting force on the crankshaft at all speeds of the engine. This statement is not exactly correct, for, as everyone is aware, there is a limit to the petrol engine's speed and, therefore, at very high speeds the torque exerted decreases. The same applies at very low speeds when the engine begins to "stall." However, within the working speeds at which the engine is driven the torque exerted is practically constant. The power of the engine is proportional to the product of the torque and speed. It is thus seen that the maximum amount of power is developed at high speeds.

It is unfortunate that the petrol engine will not develop any torque without the engine running. This feature makes a clutch on the transmission imperative; for some device has to be used to cause the running engine to take up the driving of the standing transmission system without a sudden jar.

Clutches are invariably some sort of friction device, one face of which is attached to the engine and the other face is attached to a transmission shaft. The clutch pedal is arranged to allow the two faces to come together slowly and the transmission shaft should be brought up to engine speed steadily without any signs of snatching or jerking. Thus the clutch is primarily required because the engine is incapable of starting from rest while loaded.

The fact that the clutch is also necessary in gear changing is only secondary, for there are many skilled drivers that can gear-change successfully without using the clutch. However, no driver can start his car successfully without the use of the clutch.

The next essential portion of the transmission system is the gear box. Many motorists fail to comprehend fully the necessity for gears and are prone to condemn the car that requires the common use of gears and cannot be driven everywhere in "top."

It is the constant-torque characteristic of the engine referred to that makes the gear box necessary to the car.

The amount of twisting force or torque required on the back wheels of the car varies considerably. It is easy to imagine that the twisting force required on the wheels to keep the car moving on a level road is much less than that required to start the car on a very steep hill. Yet the engine exerts a constant amount of twisting force. For this reason the gear box is introduced to make it possible to vary the torque on the back wheels, although the torque exerted by the engine is constant.

Three forward gears are the practice in almost all American cars and in many of the European cars. The more expensive European cars, however, usually fit four forward gears.

In the three-gear cars, the various gears are usually known as "low," "second," and "top." When low gear is in use the engine makes the maximum number of revolutions for one revolution of the driving wheels.

When second gear is engaged, the engine makes a lesser number of revolutions than in low for one revolution of the driving wheel.

When top gear is engaged the engine makes a minimum number of revolutions for each revolution of the wheels.

As an example, low gear might mean fifteen revolutions, second, ten revolutions, and top, five revolutions of the engine for each revolution of the driving wheels.

It is thus seen that in low gear the engine has the greatest leverage on the wheels and it is, therefore, the best gear for starting or for climbing very steep grades. At the same time (taking the quoted gear ratios), the engine must revolve three times as fast for any speed as in top gear. This means that the engine will be racing at a road speed of 20 miles an hour, although at the same engine speed in "top" the car would do 60 miles an hour.

The maximum torque on the wheels available in top gear is only a fraction of that available in low (in the case quoted, one third), but the car speed is greatest in proportion to the engine speed. Top gear should therefore be used wherever practicable, that is, on level roads or reasonable inclines. Second gear is, of course, an intermediate gear between top and low and should be used wherever the grades suit it.

Many drivers fail to make the best use of their second gear, both in starting and also when hill climbing. The common mistake when starting is to change out of second into top before the car has any way on. The best practice is not to change into top until the car has reached a speed of about 15 miles an hour.

When hill climbing, the driver should not keep in top until the engine has almost stalled, and is labouring heavily; second gear should be engaged when the car has slowed to about 15 miles an hour. In this way the engine is never strained by being allowed to jerk along very slowly with a full throttle.

Another objection to allowing the car to slow right down before changing is that by the time second gear is engaged the car has practically stopped, and probably will not pick up speed in second and so the engine is "stalled."

Many drivers hesitate to change down because they are frightened to attempt gear changing at a reasonable speed. There is no reason for this fear, as a good change can be made as easily at 15 or 20 miles an hour as at a lower speed. The only difference is that some drivers have not had the necessary practice at changing down when the car is moving rapidly.

In the case of cars with four gears the change down from top to third on a hill should always be made before the car loses speed, otherwise the car will fail to pull in third, and another change will be necessary.

It is good practice on a four-gear car to change from top at about 20 miles an hour when hill climbing.—"Radiator," in the "Farmer and Settler."

THE EMPIRE MARKETING BOARD.

The Empire Marketing Board was set up by the Government at the suggestion of the Imperial Economic Committee. It has for chairman the Secretary of State for Dominion Affairs. His predecessor in office is also a member of the Board. Representatives of the self-governing Dominions, of the Colonies, and of home producers and consumers share with them a task of large Imperial significance.

As a body detached from party politics, but intimately aware of the economic needs of the Empire, whether at its heart or at its outermost fringes, the Board has the task of recommending grants from a fund provided yearly for the purpose by the Imperial Parliament.

The Board's policy is to stimulate the consumption within the United Kingdom of Empire products, whether grown at home or brought from overseas.

To this end it aids in improving the quality of Imperial produce, by encouraging research into problems of cultivation, of resistance to the ravages of plant and animal disease, of grading and packing, of transport and marketing.

It invites every Australian to help forward this vital Empire movement by buying the produce of their kinsmen at home and overseas in preference to foreign produce.

Already, on British markets, the influence of the Board has been made manifest, and much interest in Australian products has been stimulated by its well-directed and far-sighted activities.

" The Stallions Registration Act of 1923."

LIST OF REGISTERED STALLIONS.

LIST OF BLOOD STALLIONS CERTIFICATED FOR LIFE IN THE SOUTHERN DISTRICT.

Stallion.	Owner.	Address of Owner.
Admetus	H. J. Kime	Ascot
Ahab II.	A. Sparkes, Ltd.	Brisbane
All Gold	B. Gately	Gresham Hotel, Brisbane
Amberdown	T. Jennings	Greenmount
Applegarth	W. J. Watson	View Field, Clarendon
Ayr Bridge	W. J. Lawlor	Derby Estate, Enoggera
Ayrport	B. Smith	Woolooga
Bachelor's Perse	W. Glasson	Manapouri, Nobby
Battlebridge	R. A. Howell	Killarney
Bebbington Boy	J. O. Mareland	Cinnabar
Ben Riff	J. Stebbins	Wiethe, Wallaville Line
Black Friar	H. Adams	care of V. Bergstrom, Stevenson street, Ascot
Black Leaf	A. G. F. Munro	Goodar, Goondiwindi
Black Prince	P. Portly	North Ipswich
Blue Star	J. B. Nutting	Normanby
Bonnie Ardon	C. Bassingthwaite	Jandowae
Bonnie Hatan	M. Livingstone	West Talgai
Boomara	P. J. Bishop	Cooyar
Borrosong	E. G. Blume	Ascot
British Born	R. Armstrong	Laura street, Windsor
British Dan	J. Millis	Nanango
Cagou	Flemmich and Davey	Ghinghindi
Calm Laddie	P. J. Frawley	Alma street, Clayfield
Captain Hardie	W. A. Bauer	Mount Sylvia, Gatton
Chantlezore	C. A. McCallum	Two-Mile, Nanango
Charlotte Russe	G. R. Watson	Welford, Nangwee
Clydeside	M. Livingstone	West Talgai, Clifton
Cock of the Heath	J. S. Mylett	Josephville
Coin Nut	D. J. Kerr	Riverton street, Clayfield
Collarette	J. Doyle	Windorah
Cymric	S. McCracken	Bundaberg
Dark Bread	C. Barry	Cecil Plains
Destruction	Strymgeour, Ltd.	Callandoon, Goondiwindi
Dween	T. Wilson	Steeley street, Ascot
Donore	F. Jurg	Cecil Plains
Don Scorn	J. Grieve	Glenhowden Estate
Duncliff	J. F. Johnson	Currajong, Gin Gin
Earl Haig	H. W. Dight	Long Lagoon
Electric Lad	C. F. Schmid	Kandanga, Gympie
Euclid	A. H. Braithwaite	Murgon
Eudor-east	J. Cagnacci	Mudgeeraba
Eudorus	S. A. Taylor	Bon Accord, Dalby
Euroa	F. Jurgs	Cecil Plains

Blood Stallions Certificated for Life in the Southern District—continued.

Stallion.	Owner.	Address of Owner.
Fairy Bob	E. G. Blume	Ascot
Far Nicer	M. Livingstone	West Talgai
Fayal	M. W. Barton	Cambooya
Flaxen	F. Farrelly	Degilbo
Flaxwood	W. J. Proctor	Mount Perry
Foot Guard	F. Garmeister	Upper Tent Hill, Gatton
For My Lady	T. A. Clapperton	Tarong, <i>via</i> Nanango
Frasca	G. F. W. Goodrich	Waroo
Fugit	E. G. Blume	Ascot
Gallipoli	Cockerill	Glenrock, Kingaroy
Goard	S. A. Taylor	Bon Accord, Dalby
Go Hard	S. A. Taylor	Bon Accord, Dalby
Gold Tie	Collins Bros.	Mount Surprise, <i>via</i> Cairns
Goya King	Les. Cook	Greenmount
Guinea Ribbon	Fred Langford	Goondiwindi
Halberd	Lord and Sons	Eskdale, Esk
Halmond	W. H. Hayes	Mount Stanley, Linville
Harry Brandt	G. M. D. Mundell	Red Marley, Condamine
Herobrook	Mrs. Mary Moore	Myall Park, Miles
Highfield	J. H. S. Barnes	Canning Downs
Hindoo Star	W. Bagaley	Warwick
Home Rule	J. E. Grout	Musket Flat, <i>via</i> Maryborough
Honda	R. E. and E. O. Frey	Inglewood
Hopoaat	R. Birchley	Eidsvold
Iggaree	A. E. Jones	Euroha, Eidsvold
In Trouble	J. E. Shailer	Ascot
Itinerant	H. E. Meddleton	Dumaresq
Jemedah	Mr. Kent	Nulgilday, Eidsvold
Kamos	A. H. Watson	South Killarney
Kenilworth Lad	W. L. Downes	Bell
Kenish Fire	Gus Rienke	Rosewood
Kerman	Arnold Weinholt	Wash Pool, Kalbar
Kewi King	T. B. Foster	Rockhampton
King Apple	J. Douglas	Windsor
King Halberd	J. Schubel	Purga
King-o' Malt	J. Kennedy	Kilcoy
Koatanui	W. H. Thrupp	Roma
Ladomond	W. Backhouse	Killarney
Laddo	Thos. Dingle	Drummer's Creek, Mt. Perry Line
Larceo	W. Hallett	Pony Hills
Leverrier	E. L. Ramsey	Umbiram
Lincome	E. K. McCord	Coonambula
Lodi	J. Murray and Sons	Ilfracombe
Lord Ambrose	S. A. Taylor	Bon Accord, Dalby
Lord Burnside	S. A. Taylor	Bon Accord, Dalby
Lord Haco	Bell Bros.	Kinnoul
Lord Highfield	W. Prosser	Spring street, Hendra
Lord Lyndhurst	Fred. H. Cockerill	Glenrock, Kingaroy
Lord Senyam	P. J. Mayne	Warwick
Loyal Shepherd	E. G. Blume	Lancaster road, Hamilton
Maloola	J. P. Ryan	Gympie
Marcoda	B. Welsh	Wagga Wagga, New South Wales
Master Loch	W. T. Hodgson	The Retreat, Yeulba
Master Orcus	C. A. McCallum	Nanango
Matouree	L. Wedemeyer	Eidsvold
McIlwraith	T. A. Clapperton	Tarong, <i>via</i> Nanango
Midad	W. L. Rowling	Toolburra

Blood Stallions Certificated for Life in the Southern District—continued.

Stallion.	Owner.	Address of Owner.
Midnight Frolic	J. B. Shannon	Oxford Downs, Nebo
Mikado	H. J. Franki	Meringandan
Modesto	C. J. Swinburne	Toolburra
Nardini	W. C. McNaughton	Yandilla
Night Flyer	Treweecke and Sons	Umbercollie
Noble	Alf. Falls	Hedley Hill
Nonsuch Laddie	C. Flannery	North Branch
Oliver Twist	G. W. Morgan	Longview Farm, Childers
Orient Mail	J. T. Shannon	care of V. Bergstrom, Ascot
Our Day	S. Smith	Toowoomba
Our Fox	J. W. Archer	Kilcoy
Paddington	H. J. Winten	Rosalie
Paree	T. McGarrigal	Laidley
Patrick Bourne	H. C. Sherriffs	Chinchilla
Petalaster	M. J. Mylett	Linville
Plain Doone	H. McKenzie and R. Kelly	Hamilton
Polybius	M. Yore	Logan Village
Polycraft	M. Ryan	Kialla Stud, Greenmount
Prime Boy	R. M. Bell and Co.	Eskdale South, Esk
Rambler	H. E. Middleton	Dumaresq, Texas
Rappel King	W. McDonnell	Deuchar
Rifle Ross	S. A. Taylor	Bon Accord, Dalby
Rivoli	J. H. S. Barnes	Canning Downs, Warwick
Robin	Jas. Williams	Yagabarni
Ross Gun	S. A. Taylor	Bon Accord, Dalby
Roulette	F. Mason	Palen Creek, Rathdowney
Royal Right	W. M. Philp	Toowoomba
Roychester	D. Stark	Anduramba, Crow's Nest
Salopian	Duncan Bros.	Isis
Scotland Yet	F. J. Armstrong	Pilton road, Clifton
Seige Moi	J. C. Doebelin	Yatala
Seremond	McDougall Estate	Lyndhurst, Warwick
Shell Shock	S. A. Taylor	Bon Accord, Dalby
Silastre	B. Newman	Ayr
Sir Danaus	D. Murray	Drillham
Sir Rino	S. Mylett, Junr.	Beaudesert
Soldier's March	H. Pownall	Stockwell, Builyan
Spring Boy	P. G. Hallam	Eidsvold
St. Atty	Chas. D. Persse	Tabragalba
St. Eiffel	D. Cullen	Pampas
Thalassa	W. Goodrich	Waroo
Tinspear	Arnold Wienholt	Wash Pool, Kalbar
Tom Bernie	R. Betts	Boonah
Town Crier	John Leahy	Valeview, Kinbombi
Underarm	Dunne Bros.	Deception Bay, Burpengary
U.N.I.	J. B. Shannon	Oxford Downs, Nebo
Varicose	T. Dunn	Silvavale, Kingaroy
Veresdale	W. M. Elliott	Veresdale
Walker's Lad	T. Symonds	Mackay
Warsaw	E. R. Barry	Jandowae
Warwick Gun	T. Jennings	Greenmount
White Monk	W. H. Gibley	Dalby
Winsome Prince	F. Nelson	Guluguba
Yellburn	J. S. Williams	Spring Creek

LIST OF BLOOD STALLIONS CERTIFICATED FOR LIFE IN THE CENTRAL DISTRICT.

Stallion.	Owner.	Address of Owner.
Acrobat	Wm. H. Bell	Strathdee, Mackay
Alorse	Baker Bros.	Maltford, Capella
Baldpate	Coreena Pastoral Co. ..	Barcaldine
Beechmont	W. C. Geddes	Balmoral
Ben Thor	Martin T. Burke	Springsure
Benzine	M. L. McLaughlin	Burnside, Springsure
Betrayer	T. B. Stanners	Selina, Q.C.R.
Bit-by-Bit	Edward Hannan	Aberdeen, Savannah, Mackay
Black Jack	C. W. Ney	Nebo
Blarney	J. E. Ball	Uboho, Many Peaks
Boko	J. B. Shannan	Oxford Downs, Nebo
Borghese	Mrs. E. T. Thomson ..	Coboolima, Calliope
Bondsgun	C. Bauman	Tryphinia View, Duaringa
Brown Danube ..	D. Blain	P.O., Yeppoon
Brisbane	Police Breeding Station..	Rewan
Butler	Archibald McPacey ..	Merimal
Bobzard	N. E. Perry	Braeside, Nebo
Callaissant	J. B. Shannon and Co. ..	Nebo
Calid	Peak Downs Pastoral Co.	Capella
Capell	A. E. Rideout	Ballie Farm, Mount Larcom
Captain Night ..	J. O'Sullivan	Glencoe, Many Peaks
Cardigan	T. P. Hausler	Clermont
Certies	John Dalrymple	Nebo
Coat of Mail ..	Mackenzie, Ltd.	Tooloomba, Styx
Cornshine	L. L. Johnston	Mira, Comet
Cruzot	T. B. Starkey	Rainworth, Springsure
Deerborough ..	M. Ryan	Arcturus Station, Springsure
Delator	C. W. Wickbold	Lake Learmouth
De Lyosa	Mackenzie Bros.	Coolarah, Alton Downs
Dighton	Cudmore and Sons	Tara Station, Saltern
Dooloogra	Wallis and Co.	Mount Spencer, <i>via</i> Eton
Early Star	Mackay and Co.	Huntly
Eman	John Fenlon	North Rockhampton
Ercanil	Police Breeding Station..	Rewan
Faithful Laddie ..	R. G. Talbot	Ripple Brook, St. Lawrence
Fearless	H. J. Friend	Springwood, Springsure
Flavian	Mackenzie, Ltd.	Tooloomba, Styx
Flavie	Mackay and Co.	Huntly Station, Claremont
Gozardo	R. J. McClure	Mackay
Gricka	C. W. Wright	Waverley Station, St. Lawrence
Gringalet	Mackenzie, Ltd.	Tooloomba, St. Lawrence
Henorite	L. S. Richards	Mount Hillalong, Nebo
Hillapine	James Breen	Yukan, Sarina
Itys	Henry Beak and Sons ..	Broadmeadow, Nankin Junction
Jack Lad	F. Fox	Killarney, St. Lawrence
Jewel Lad	A. E. Rankin	Bimbie, Duaringa
Kenoskye	W. Rownall	Many Peaks
Kerwaka	Bigge and McConnel ..	Consuelo, Springsure
Land Gem	J. W. Mylrea	Mona Vale
Last Call	Catherine Bauman ..	Tryphinia
Libertine	Police Breeding Station..	Rewan

Blood Stallions Certificated for Life in the Central District—continued.

Stallion.	Owner.	Address of Owner.
Lockmayne	Cook and Cook	Green Mound, Pleystowe
Lord Ayr	Sarah Carington	Comet
Lord Davill	George Daniels	Gindie
Lord Elderslie	Police Breeding Station..	Rewan
Maltbush	John Shannan	Saltbush, St. Lawrence
Marmion	John Shannan	Saltbush, St. Lawrence
Master Borgese	Geo. Lanivan	Banana
Master Togo	R. J. Mylne	Gladstone
Master Trumpcorn	Andrew Jackson	Basalt Creek, Rolleston
Medal	E. D. Wells	Rolleston
Mountain Lad	Gilchrist, Watt, and Cunningham	Glen Prairie, Marlborough
Orphan	P. Keune	Priora, Clermont
Parthleigh	Frank Fox	Killarney, St. Lawrence
Poseur	J. Arthur	Braeside, Barcaldine
Publican	J. Clarke	Barcaldine Downs, Barcaldine
Rightaway	H. G. F. Schneider	Mount View, St. Lawrence
Robin Hood	Winter, Irving, and Ailson	Springsure
Roseacre	Wilson and McDouall, Ltd.	Calliope
Siege Artillery	A. Crowther Williams	Homevale, Nebo
Silver Ford	H. C. S. Griffin	Wolfgang, Clermont
Sir Sefton	Collaroy Pastoral Co.	Collaroy
Smart Laddie	Dunne and Sons	Wooroona, Duaringa
Spearman	Bleak Pastoral Co.	Gladstone
Steel Cover	Anderson	Mirani, Mackay
St. Elmo	J. F. Rush	Koumala
St. Nivas	McLaughlin, Ltd.	Raby Creek, Duaringa
Sunny Side	Arthur Beak	Wallangie, St. Lawrence
Sweet Fox	R. Logan, care of H. V. Hinton	Rockhampton
Timolean	Australian Mercantile Land and Finance Co.	Rebio, Capella
Tweedy King	W. J. Becker	Taroom
Turkish Lad	Police Breeding Station..	Rewan
Windsor	Mrs. E. T. Thomson	Bocoolina, Calliope
Wolowa	P. Comiskey	Withersfield
Yaambin	T. Salmond	Laglan, Claremont
Young Flavian	Mackenzie, Ltd.	Toooloomba, Styx
— (unnamed)	Staff Bros.	Woodstock, Marlborough
— (unnamed)	Thos. Symonds	Oakdale, via Eton

LIST OF BLOOD STALLIONS CERTIFICATED FOR THE YEAR 1925-26 IN THE SOUTHERN DISTRICT.

Stallion.	Owner.	Address of Owner.
Ardglen	W. J. Munro	Southport
Bell's Folly	R. Bell	Jubilee Hotel, Leichhardt street, Brisbane
Black Joke	E. L. Ramsay	Umbiram
Bright Grain	J. Kelly	Russell street, Toowoomba
Cheviotdale	T. M. Ahern	Gresham Hotel, Brisbane
Count Gervase	J. T. Joyce	Brisbane
Craftdancer	P. Scully	care of T. Wall, Booval
Dal	C. F. Maitland	Biggenden
Glenoban	M. Livingston	West Talgai
Halberk	Mrs. Angel	Murgon
Kilo	A. G. Robinson	Eidsvold
Laddie Boy	T. Carroll	Sandgate road, Albion
Lord Lebius	A. Hunter	Nanango
Lord Redfern	H. Shirlaw	Augathella
Marshall Field	W. J. Noud	Clayfield
Mathover	E. P. Itztein	Degilbo
Olive Steel	J. F. O'Sullivan	Wallaville, Gin Gin
Palevan	E. L. Ramsay	Umbiram
Pat Doonan	F. Jurg	Cecil Plains
Persse's Double	W. J. Noud	Kent street, Hamilton
Prince Kerman	C. L. R. Nye	Buderim Mountain, N.C.L.
Romany Love	W. C. Byrne	Gordon street, Hendra
Sir Lovelace	Roy Palmer	Eureka, Childers
Tabragalba	J. Clark	Union Bank Chambers, Queen street, City
The Swan	A. G. F. Munro	Goodar, Goondiwindi
Toe	J. H. S. Barnes	Warwick

LIST OF BLOOD STALLIONS CERTIFICATED FOR THE YEAR 1925-26 IN THE CENTRAL DISTRICT.

Stallion.	Owner.	Address of Owner.
Marcus Highfield	Wilson and McDouall	Calliope Station
Midnight	Galloway Plains Pastoral Co.	Gladstone
The Grouse	J. Bryns	Bookmaker, Rockhampton
Utaire	W. C. Miller	Coreena, Barcaldine
— (unnamed)	Gilechrist, Watt, and Cun- ningham	Glen Prairie, Marlborough

**LIST OF BLOOD STALLIONS CERTIFICATED FOR THE YEAR
1926-27 IN THE SOUTHERN DISTRICT.**

Stallion.	Owner.	Address of Owner.
Cornmore	J. Y. Shannon	care of M. Bergstrom
Chantross	W. Loughlin	Milmerran
Chryscup	W. K. Bushell	Edmond street, Newstead
Lauderdale	I. J. Moore	Ascot
Lord Demon	C. Caswell	Brisbane
Piastoon	R. H. Edkins	Bimbah, Longreach
Reamer	G. E. Atthow	Brisbane
Royal Dignity	L. V. Nicol	London road, Clayfield
Smithfield	D. A. Winton	Smithfield, Toowoomba
The Dragon	E. J. Dickson	Hill End, South Brisbane
Wee Glen	P. J. Frawley	Alma street, Clayfield
Zohob	I. Freedman	New Farm, Brisbane

LIST OF DRAUGHT STALLIONS CERTIFICATED FOR LIFE IN THE SOUTHERN DISTRICT.

Stallion.	Owner.	Address of Owner.
Admiral Beatty	J. A. McRae	Raeburn, Crow's Nest
Admiral II.	C. A. Dunenann	Highfields
Bally	C. Knack	Broadmere
Baron Bold	F. M. Heineman	Eulo, <i>via</i> Cunnamulla
Baron Carlyle	Jondaryan Estates	Jondaryan
Baron Kelvie	Jas. Tobin	Curralong Creek, Gin Gin
Baron Swanson	E. A. Ensor	Ascot, Bell
Billy	F. G. Armstrong	Clifton
Billy	E. Carroll	Jandowae
Billy	C. H. Morris	Wattle Glen, Pratten
Black Dight	A. G. F. Munro	Goodar, Goondiwindi
Blaze	W. Backhouse	Killarney
Bold Wyllie	Department of Agriculture and Stock	Brisbane
Bonnie	T. Embrey	Kingaroy
Boonah	S. Venall	Mutdapilly
Boro Wigton	G. R. Watson	Nangwee
Brave Boy	E. Ziebarth	Blenheim, Laidley
Brigadier	J. G. Rattey	Fairy Mount, Jandowae
Bright Star	J. J. Doyle	Northcote street, East Brisbane
British Abbott	Jas. Barbour	Glen Ken, Esk
British Hope	W. Frood	Winterdyne, Pittsworth
British Victory	McCulloch Bros.	Milmerran
Broken Blaze	G. Watson	Oak Park
Bunya Baron	Reiss Bros.	Goombungee
Bute Bawnet	Gross Bros.	Campbell Plains
Capt. Clyde	Lavender and Co.	Richlands, Meringandan
Capt. Dale	A. T. Creswick	St. Helen's
Carlyle Crystal	A. Langmore	Prairie, Jondaryan
Carlyle Yet	E. B. A. Armstrong	Mywybilla, Oakey
Crown Royal	J. B. Edwards	Kingaroy
Crystal	J. Dalton	Spring Creek
Crystal Blaze	Mrs. A. F. Watson	Yarranlea
Darwin II.	J. P. Walsh	Mount Perry
Doctor Graham	E. G. Payne	Brooinia road, Chinchilla
Donald Crystal	L. Wedemeyer	Eidsvold
Donald's Pride	F. W. Abraham	Lark Hill, Walloon
Drumshambo	M. J. Nolan	Crossdale, Esk
Duke	J. P. Fleming	Texas
Earl Carlyle	J. H. Fairfax	Cambooya
Fearnaught	W. Deacon	Allora
General	F. B. Kerle	Mount Tarampa, Coominya
General Wallace	Department of Agriculture and Stock	Brisbane
Glenalla	Department of Agriculture and Stock	Brisbane
Glencairn	W. P. Casey	Milbong
Glenfern	W. R. Sahiff	Kilkivan
Glylad	R. P. Lepp	Greenmount
Grandmaster	W. J. Grayson and Son	Killarney
King	A. Hunter	Nanango
King	Bindango Pastoral Co.	Bindango
King Borah	D. McGregor	Craig, Royston, Milmerran
King's Council	Shine Bros.	Fernvale
Knight	A. J. Specht	Tahara, Wellcamp

Draught Stallions Certificated for Life in the Southern District—continued.

Stallion.	Owner.	Address of Owner.
Lion	W. T. Hodgson	The Retreat, Yeulba
Links	Turner and Munro	Wyaga
Lord McIvor	F. B. Cary	Vermont
Lord Wigton	T. Phelan	Gladfield
Mac	A. D. Spence	Kiaora, Wallumbilla
Major	Thos. Hanney	Bunya road, Dalby
My Pride	J. McGahan	Yangan
Percy	H. Cadel	Northern road, Roma
Pilot	John Campbell	Laidley
Premier Again	Department of Agriculture and Stock	Brisbane
Premier's Fancy	W. J. Borchert	Murgon
Pride of Invermay	H. Retschlag	Bonney View, Rathdowney
Pride of the Valley	O. F. Zischke	Glen Grove, Forest Hill
Prince	E. W. Genrich	Cooyar
Prince George	D. Carrol	Kingaroy
Prince George II.	A. C. Krieg	Brookstead
Prince Invermay	J. Fogarty	Avon Vale, Clifton
Prince Percy	A. Cooper	Burrumbilla
Prospector	Department of Agriculture and Stock	Brisbane
Punch	W. E. Houston	Blackbutt
Robin	J. Kelly	Mount Sturt
Robin	J. W. Retter	Mount Tyson, Oakey
Rory Prince	M. S. Bishop	Glengowrie, Cooyar
Royal Hope	Thos. Telford	Springvale, Clifton
Royal Salute	M. J. Mylett	Linville
Royal Shepherd	E. Hess	MacLagan, Jondaryan
Shepherd's Pride	R. T. Jones	Toowoomba
Silver Crown	T. Bishop	Rocky Glen, Cooyar
Sir Walter	J. Drinan	Wallaville, <i>via</i> Bundaberg
Squaredale	Jas. Sprott	Talgai West, Ellenthorpe
St. George	R. Sippel	Redgate, Murgon
The Admiral	C. Keilor	Maleny
The Intent	Jas. Sprott	Talgai West, Ellenthorpe
Union Jack	A. Winter	Taabinga, Kingaroy
Valley Royal	Guy Watson	Pittsworth
Widgiewa Banker	T. J. Turkington	Pilton, Nobby
Wigton Boy	Ronald McDougall	Cooyar

LIST OF DRAUGHT STALLIONS CERTIFICATED FOR LIFE IN THE CENTRAL DISTRICT.

Stallion.	Owner.	Address of Owner.
Baldy	Arthur Beak	Willangie, St. Lawrence
Baroona Majesty	Department of Agriculture and Stock	State Farm, Gindie
Birdwood	J. C. Wells	Gothlands, Springsure
Black Prince	Gilchrist, Watt, and Cunningham	Glen Prairie, Marlborough
Bortim	J. B. Shannon	Oxford Downs, Nebo
Brown Lock	David S. Warnock	Mount Pleasant, Malchi, Grace- mere
Brown Prince	A. W. Christiansen	Raglan
Brown Ronald	Australian Mercantile Land and Finance Co., Ltd.	Retro
Ced	Baker Bros.	Malthoid, Capella
Clyde	Edmund Jowett	Vergement, Longreach
Cob	Daniel Brand	Three-Mile, Homebush
Conqueror	John Shannon	Saltbush Park, St. Lawrence
Darnley	J. B. Shannon and Co.	Cockenzie
Darnley Again	Beck Pastoral Co.	Gladstone
Duke	A. Hoff	Nagoorin
Duke	Jas. Kersey	Sunnydale, The Caves
Gilbert	F. Myles	Burnum, Many Peaks
Hopewood Pride	J. B. Shannon	Oxford Downs, Nebo
Imperial Knight	A. Hoff	Nagoorin
King Arthur	Department of Agriculture and Stock	State Farm, Gindie
King Harold	J. Brough	Habana
King of the Ring	J. P. Kielbach	Sunnyside, Mackay
King's Council	Wm. Henry Arlette	Mount Convenient, Sarina, Mackay
Kiwi	Thos. McNae	Bryne View, Many Peaks
Loch Lomond	W. Pownall	Dackiel, Many Peaks
Major	W. J. Bennett	Clermont
Marathon	E. J. Brewer	Over Cliff, Sarina
Mark	F. B. Starkey	Rainworth, Springsure
Mick	Alexander Watt	Glenham
Nobel	Thos. C. Seierup	Scrubby Creek, Gracemere, Rock- hampton
Operator	Peak Downs Pastoral Co.	Capella
Prince Fearnought	J. C. Rasmussen	Mount Convenient, Sarina
Punch	C. Emery	Bororen
Punch	W. J. Greedy	St. Lawrence
Robin	Ernest John Brewer	Over Cliff, Sarina
Roddy	J. B. Shannon	Oxford Downs, Nebo
Royal	T. Childs	Cania Diggings, Many Peaks
Royal Crown	C. Hanman	Savannah, North Eton
Royal Robert	A. C. Williams	Homevale, Nebo
Royal Simin	Bigge and McConnel	Coronelo, Springsure
Saxon	Fred P. Hickman	Uplands, Bororen
Yaamba	G. E. MacDonald	Dunrobin Park
Young Conqueror	J. B. Shannon	Oxford Downs, Nebo
Young Royal	R. L. James	Rosedale
Young Shannon	Wilson and McDouall, Ltd.	Calliope Station, Calliope
— (unnamed)	W. J. Bennett	Clermont
— (unnamed)	A. G. Lawrie	Evergreen, Westwood
— (unnamed)	J. B. Shannon	Oxford Downs, Nebo
— (unnamed)	B. Wagner	Marylands, St. Lawrence
— (unnamed)	H. J. Wagner	Marylands, St. Lawrence
— (unnamed)	J. J. Campbell	Police Breeding Station, Rewan

LIST OF DRAUGHT STALLIONS CERTIFICATED FOR THE YEAR 1925-26 IN THE SOUTHERN DISTRICT.

Stallion.	Owner.	Address of Owner.
Admiration	J. Breyden	Brooklyn
Baron Sheriff	A. C. B. Bligh	Kurrawah
Barrister	J. B. O. Evans	Allora
Bay Boy	J. Ryan	Yeulba
Bright Dale	Alfred C. Wagner	Boonah
Bright Star	R. Craike	Wildash
British King	Hart Bros.	Clifton
British Laddie	J. H. Funk	Milmerran
British Oak	Jas. Sprott	Talgai West, Ellenthorpe
Campbell Royal	Mrs. A. F. Watson	Oak Park, Yarranlea
Campbell Spot	H. Seiler	Tingoora
Cedric	T. J. Ryan	Maryvale
Colonel Wigton	G. R. Watson	Nangwee
Craigie Willie	W. J. Ridgwell	Apple Tree Creek, Isis
Crystal Comet	Mrs. A. F. Watson	Yarranlea
Doctor	J. J. Baxter	Boxwood, Taroom
Douglas	C. S. Doeblin	Yatala
Duke	J. A. Mossman	Emu Hill, Miriam Vale
Duncan	Lord and Sons	Eskdale, Esk
Excelsior	J. W. Horrobin	Silverdale, Tingoora
General Pride	F. F. Harm	Plainland, Laidley
Glenogle	G. R. Walker, Junr.	Stockyard Creek
Glenore	J. Linnan	Lake Clarendon, Gatton
Hendon Hope	W. T. Birt	Mount View, Miva
Hope III.	Ferrier Bros.	Surat
Hugo	Jas. Sprott	Talgai West, Ellenthorpe
In-the-Boom	W. F. Greenslade	Nanango
Joe	P. Meyer	Reid's Creek
Ken	J. O'Shea	Southbrook
Lance Jack	A. T. Creswick	St. Helen's, Pittsworth
Logio	J. S. Tosh	Cromdale, Warra
Logie Boy	Jas. Kennedy	Kumbia, Kingaroy
Lucky Willie	H. W. Wingfield	Ulmara, Clarence River, New South Wales
MacGregor	F. P. Alexander	Forest Park, Dalby
Major	C. Grieve	Walloon
Malcolm	M. M. Gordon	Grosvenor Downs, Clermont
Marshall Allenby	Queensland National Pastoral Co.	Brisbane
Marshall Haig	J. Anderson	Pittsworth
Marshall Joffre	J. Johnston	Mackay
McTavish	Scott McLeod	Terricka
Nobby	B. E. Free	Nobby
Pretender	J. Lehmann	Frenchton, Rosewood
Pride of Glen Cairn	E. G. Henderson	Brooyar, Sexton
Prince Charlie	C. A. V. Barber	Rywang
Prince Charlie	G. W. A. Kerr	Kia Ora, Kogan
Professor	M. L. McMillan	Lochinvar, Ayr

Draught Stallions Certificated for the Year 1925-26 in the Southern District—continued.

Stallion.	Owner.	Address of Owner.
Prosfield	Queensland Agricultural High School and College	Gatton
Punch	Hunter Bros.	Cinnabar
Rob Roy	G. A. Salisbury	Rathdowney
Royal Cellus	G. Weir	Hatton Vale, Laidley
Royal Crystal	Mrs. A. F. Watson	Oak Park, Yarranlea
Royal George	Fairymead Sugar Co., Ltd.	Bundaberg
Royal Jock	C. Martin	Marburg
Royal Scotch	Mrs. A. F. Watson	Yarranlea
Scotland's General	Jondaryan Estates	Jondaryan
Sir George II.	W. Knack	Summerhill, Laidley
St. George	W. A. Schimke	Summerhill, Laidley
The General	G. R. Watson	Nangwee
Tiger	G. Watson	Pittsworth
Vampire	August Dau	Coleyville
Warwick Lad	State Farm	Hermitage
Young Baron Kelvie	J. Weise	Blenheim
Young Dunrobin	J. Campbell	Haden
Young Prince	F. A. Mitchell	St. Aubyn, Crow's Nest
— (unnamed)	C. A. Munro	Arcot, Silverspur

LIST OF DRAUGHT STALLIONS CERTIFICATED FOR THE YEAR 1925-26 IN THE CENTRAL DISTRICT.

Stallion.	Owner.	Address of Owner.
Baron Duke	H. C. S. Griffin	Wolfgang, Clermont
Bill Lad	Mackay and Co.	Huntley Station, Clermont
Bostock Lad	John Shannon	Saltbush, St. Lawrence
General Wheeler	A. C. Williams	Homevale, Nebo
Major II.	E. Hannan	Savannah, North Eton
Niger	F. B. Starkey	Rainworth, Springsure
Royal Cellus	M. O'Donohue	Comet Downs, Springsure
Royal Surge	John Shannon	Saltbush, St. Lawrence
Young Lockwood	J. B. Shannon	Cockenzie, Nebo
— (unnamed)	Arthur Beak	Wollargie, St. Lawrence

LIST OF DRAUGHT STALLIONS CERTIFICATED FOR THE YEAR 1926-27 IN THE SOUTHERN DISTRICT.

Stallion.	Owner.	Address of Owner.
Bright Dale	A. C. Wagner	Boonah
Cedric	T. J. Ryan	Clintonvale, <i>via</i> Warwick
Colonel Wigton	G. R. Watson	Nangwee
Corporal Dale	A. G. Creswick	Pittsworth
Glenore	H. Embrey	Tallegalla
Glenshea	W. Frood	Winterdyne, Pittsworth
Lucky Dale	A. G. Creswick	Pittsworth
Major Dale	A. G. Creswick	Pittsworth
Mossdale	F. A. Coxton	Nottingham Downs, Whitelands
Nobby	B. E. Free	Nobby
Pretender	W. C. White and Sons	Bluff Downs, Charters Tower
Royal Cellus	P. McNamee	Benally, New South Wales
Sergt. Dale	A. T. Creswick	St. Helen's, Pittsworth
Wellford	R. A. Yarrow	Kingaroy
Young Rich and Rare	J. W. Sutherland	Inglewood

LIST OF PONY STALLIONS CERTIFICATED FOR LIFE IN THE SOUTHERN DISTRICT.

Stallion.	Owner.	Address of Owner.
Adonis	A. H. Johnson	Perrinuan, Dalby
Auckland	C. Leisemann	Toogoolawah
Black Dick	R. Traisdell	Pinelands, Crow's Nest
Black Mac	C. A. Kanofski	Grandchester
Black Opal	C. M. Smith	Smithfield, Gatton
Black Pastel	H. Arndt	Tallegalla
Black Prince	J. Murray	Bromelton
Blue Rudd	L. R. W. Kennedy	Curtis street, Bundaberg
Bobbin	C. Potter	Hail Street, Petrie Terrace
Bonnie Dien	Geo. Neale	Boobie, Nanango
Lord Rex (Bonnie Lad)	H. Cox	Ipswich
Bonny Lad	C. R. Nye	Buderim Mountain
Bonnie Mac	H. Philp	Herries street, Toowoomba
Brownie	J. H. Buhwedel	Murphy's Creek
Byron's Pride	E. A. Mulroney	Mount Alford
Clyorie	J. W. Ross	Goomboorian, <i>via</i> Gympie
Cock Robin	J. Grant	Musket Flat
Commandant	V. Farquharson	Bell street, Newtown, Toowoomba
Con	Mrs. Russell	Chinchilla
Cymro	S. Wilson	Newtown, <i>via</i> Ipswich
Dan	C. A. Munro	Arcot, Silverspur
Darby	Jas. Gray	Swanfells
Digger	W. C. McLellan	Chinchilla
Digger	E. W. Schultz	Advancetown, Nerang
Dinarth Lad	J. Jackson	care of R. Jackson, Ltd., Eagle street, Brisbane
Dinkum	W. Glasson	Manapouri
Don	S. Hansen	Kingaroy
Don	W. Hugent	Coal Creek, <i>via</i> Esk
Dudley	W. J. Cutler	Laidley
Eric	H. S. Young	Spring Creek
Gildus Rufus	A. P. Ward	Rathdowney
Ginger	B. Perry	Everton Park, Kelvin Grove
Golden Jim	H. Hock	Dalby
Golden Sunset	N. Hammant	Memerambi
Gold Dust	W. A. Bauer	Mount Sylvia, Gatton
Gulah	R. A. Howell	Killarney
Gwalia Australia	J. W. Luke	Ballandean
Hafrød Sensation	J. A. Rudd	Department of Agriculture and Stock, Brisbane
Havelock	R. Ashwell	Broxburn
Hector	H. Hickson	Toowoomba
Ivanhoe II.	J. Young	Briggs road, Ipswich
Jackie	Perritt Bros.	Kabunga, Kinbombi
King	E. B. Tribes	Kilcoy
King of the Dandies	F. Thornton	Wamuran, Kilcoy
Kubelick	A. E. Bracker	Elgecombe, Texas
Little Don	Lionel Range	Kogan
Little Fire	J. Corcoran	Beaudesert
Little Rufus	R. Gordon	Yarraman
Logan Bantam	Wm. Waugh	Maidavale, Kainkillenbun
Ludo	E. Pocock	Palmer street, Windsor

Pony Stallions Certificated for Life in the Southern District—continued.

Stallion.	Owner.	Address of Owner.
Magic	J. P. Costello	Ann street, Maryborough
Magpie	J. Thompson	Dalby
Mahaka	J. C. Stockden	Cinnabar
Mahomet	M. E. Galloway	Cootharaba, <i>via</i> Gympie
Major Hall II. ..	A. L. Williams	Wallumbilla
Master Amber ..	C. R. Gore	Pelican
Master Cookoo ..	D. H. Perry	Milmerran
McShanis Choice ..	C. Thompson	Stanthorpe
Medium	S. Jurd	Marella, Stanthorpe
Merry	Stan. Arthur	Keetah, Yelarbon
Merry King	D. Neville	Elphinstone
Mickey	W. O'Neill	Seymour road, Ascot
Mike	Nathan Chicken	Jondaryan
Model Boy	H. G. Loveday	Toowoomba
Pastel of Auchlachen	H. M. Chaille	Blink Bonnie, Esk
Pat	W. Clariss	Palmvale, Taroom
Phoenix II.	N. H. Wieland	Currajong Creek, Tirroan
Plume	Ola Akesen	Taabing, Kingaroy
Prince Badger ..	Herbert Sinnamon ..	Moonbra, Esk
Prince Edward ..	J. J. Delaney	Isis Central Mill
Prince Fauntleroy	Cecil Roberts	Croxley
Prince Harold ..	T. E. B. Dingle	Drummer's Creek, Mount Per Line
Roma	Athol Campbell	Woodford
Romp	J. Stiler	Durong, Wondai
Rosco	C. C. Ringlestein ..	Walloon
Rover	T. C. Huth	Mount Perry
Sandy	D. Smith	Nanango
Signaller	J. V. Coughlan	Combango, Yeulba
Segnit	P. H. Elks	Stanthorpe
Silver Gleam	Hart Bros.	Head Hill
Silver King	John Millins, Junr. ..	Wheatvale, <i>via</i> Warwick
Silver King	Owen Mitchell	Mount Colliery, Tannymorel
Simple Jim	A. Petzlen	Stanthorpe
Spring Bright Laddie	Stewart Bros.	Avonell, Toogoolawah
Sivelshie	W. Bradley	Koondaii, Bell
The Master	E. R. Barry	Jandowae
Thomas	E. R. Roberts	Careena, Kogan
Tibby	E. W. Baxter	Remount Depot, Enoggera
Tim Thumb	H. E. W. Walpole ..	Warra
Tiny Town	J. Diamond	Burnett street, South Bundaberg
Titmouse	F. Henderson	Camp Hill, Coorparoo
Togo	D. J. Egan	Cooyar
Tom Thumb	Mrs. A. H. Scantlebury ..	Kurrajong Park, Miles
Toy	O. B. Olsen	Atthow Parade, Nundah, Brisbane
Trusko II.	M. Rynne	Cunningham
Viceroy	P. G. Eaton	Neurum, <i>via</i> Kilcoy
Welsh Lad	J. Singleton	Laidley
Welsh Star	C. Burow	Memerambi
Whiskers	Rhondda Colliery, Ltd. ..	Bundamba
Windermere Meteor	W. H. Scott	Strathpine
Wonder	H. J. B. Hutton	Glen Hutton, Helidon
You'll Do	F. Patrick	Red Hill, Gympie
Young Kim	C. Hohnke	Nanango
Young Lew Llwyd ..	Stephens and Rudd ..	Mudgeeraba
Young Romulus ..	E. J. Reif	Boonah

LIST OF PONY STALLIONS CERTIFICATED FOR LIFE IN THE CENTRAL DISTRICT.

Stallion.	Owner.	Address of Owner.
A. C.	N. G. Walker	Fairfield Station, Duaringa
Ace of Hearts	D. Allan, Junr.	St. Lawrence
Ace of Hearts	Richard Brooks	Munindilla, Goowarra
Billy	Una Olive Neil	Red Brae, Boodoola
Bonny Boy	Mrs. E. T. Thomson	Boroolima, Calliope
Dandy's Pride	Bernard J. McGuire	Belmore Hotel, Mackay
Joker	R. Farrelly	Simla, <i>via</i> Eton
Micky	Jas. Dwyer	Wandal, Rockhampton
Monty	Thomas Symonds	Oakdale, <i>via</i> Eton
Nun Nicer II.	A. Ward	Neura Plains Dairy, Rockhampton
Polo II.	E. Dougall	Miriam Vale
Rocket	G. C. Grovcock	The Grange, Capella
Sandow	Mrs. E. T. Thomson	Boroolima, Calliope
Silver Dick	W. B. Swain	The Range, Eton
Silver Watch	F. S. Creese	North Side, Mackay
Sir Butler	W. Thompson	245 George street, Rockhampton
Tom Thumb	C. Emery	Fairview, Bororen
Welsh Prince	Bernard J. McGuire	Belmore Hotel, Mackay
Whitefoot	H. F. Schneider	West Rockhampton
Zinque	Donkin Bros.	Meteor Downs, Springsure
—(unnamed)	B. M. Biddle	Clermont

LIST OF PONY STALLIONS CERTIFICATED FOR THE YEAR 1925-26 IN THE SOUTHERN DISTRICT.

Stallion.	Owner.	Address of Owner.
Badger	H. Redlen	Toogoolawah
Black Jewel	W. R. Pember	Fletcher Siding, Southern Line
Cupid	J. E. Jones	Dalby
Dapple King	R. G. Lowe	Killarney
Donald Dinnie	R. J. Cleary	Greymare
Eclipse	D. A. Affleck	Toolburra
Golden King	J. D. Hamley	Cressby, Jandowae
Hogmanay	E. G. Henderson	Brooyar, Sexton
Ivanhoe II.	J. Young	Cemetery Road, Ipswich
Johnnie	W. Pagel	Lowood
Little Boo	A. Onus	Nanango
Little Jim	Ed. Purnell	Chinchilla
Lord Ivanhoe	A. R. Harker	Peak Crossing
Medanga	G. Lohde	First avenue, Zillmere
Merry Thought	Ed. Wells	Pickanjinie
Mischief	J. Rice	Moorooka
Opal Prince	E. G. Huxham	Jondaryan
Prince of Orange	B. H. Nicol	Oakey
Red Jim	J. B. Becker	Taroom
Royal Globe	R. F. Newman	corner Hope street and Montague road, South Brisbane
Sammy	Thos. Jarrold	Dalby
Sexon	R. A. O'Brien	Dalby
The Swell	W. J. Lawler	Derby Estate, Enoggera
Wee Jock	D. J. Wyllie	The Glen, Jandowae
Welsh Gleam	Mrs. Beatrice Maxwell	Chatsworth, Gympie
Welsh Lad	J. H. Atherton	Miva
Xmas	T. D. Black	Brigalow

LIST OF PONY STALLIONS CERTIFICATED FOR THE YEAR 1925-26 IN THE CENTRAL DISTRICT.

Stallion.	Owner.	Address of Owner.
Kiwi	E. A. O'Connell	Bracewell, Mount Larcom

LIST OF PONY STALLIONS CERTIFICATED FOR THE YEAR 1926-27, IN THE SOUTHERN DISTRICT.

Stallion.	Owner.	Address of Owner.
Archer	R. A. Howell	Killarney
Mischief	W. H. Richings	Upper Paddington, Brisbane
Nabob	R. A. Howell	Killarney

LIST OF TROTTING STALLIONS CERTIFICATED FOR LIFE IN THE SOUTHERN DISTRICT.

Stallion.	Owner.	Address of Owner.
Abbey Dean	W. Smith	Nudgee road, Northgate
Afghan	H. Hayes	Brassall
Bedrock	W. Ballin	Frenchton, Rosewood
Belby	W. Craft	East Bundaberg
B. H. Wilkes	A. J. Tuckett	Rocklea
Billy Wilkes	J. Murphy	James street, New Farm
Billy Wilkes	S. Mahoney	Bundaberg
Blue Globe	W. Thomason	Bundaberg
Carlyle Wilkes	Perrett Bros.	Flinders, Fassifern Line
Childe Harold	J. Gregg	Blacksmith, Red Hill
Colin Bells	G. King	Salisbury road, Ipswich
Direction	C. H. Freeman	Silverleaf, Murgon
Don Car	G. S. Higgs	Ottaba, Esk
Financier	J. Sloss	Kingsthorpe
Harold Bells	W. Stevens	Wilga Park, <i>via</i> Warra
Haroldwood	G. Horrocks	Kalbar
Jock Beldon	F. R. Baxter	Morningside
King Bells	J. Dowridge	George street, Brisbane
King Belmont	A. N. Munro	Warwick
Longford	T. Richards	Otahuhu, Auckland, New Zealand
Major Huon	F. J. Frampton	Granville
Marvin Cole	H. H. Dunkley	Blanch View, Helidon
Marvin Cole	Mrs. E. Spreadborough	Rosewood
Merry Patch	F. Wood and A. Dingwall	Warra
Morlus	W. E. Alexander	Gunalda
Onward Silver	Nurse L. Walsh	Earl street, Red Hill
Pronto	G. L. Wilson	Mount Sturt
Ravenwood	A. E. Higgins	Toowoomba
Royal Globe	R. F. Newman	cr. Hope street and Montague road, South Brisbane
Sir Johnston	Mrs. H. E. C. Heath	Kingary
Sparkling Echo	L. B. Reese	South Brisbane
Spark	H. E. Betts	Glastonbury road, Gympie
Sparkling Jewel	W. H. Smith	Woodford
Sparkling Sun	Chas. Stephan	Gap View
St. Lucia Lad	J. T. Scrymgeour	Netherby, Warwick
Sonny Prince	B. C. W. Kochler	Yamson
Sonny Wilkes	Robt. Crooks	Allora
The Joker	J. E. Moore	Pialpa
Ukulele	B. R. Ramsey	Gympie
Victor Wilkes	C. W. Free	Clifton

LIST OF TROTTING STALLIONS CERTIFICATED FOR LIFE, IN THE CENTRAL DISTRICT.

Stallion.	Owner.	Address of Owner.
4Cole King	W. M. Beck	Carlyle street, Mackay
Dabreen	A. A. Stime	West Plain Creek, Sarina
Grand Chimes	B. Farrelly and B. J. McGuire	Broadsound road, Mackay
King Billy	M. G. Rahl	Pink Lily, Rockhampton

LIST OF TROTTING STALLIONS CERTIFICATED FOR THE YEAR 1925-26 IN THE SOUTHERN DISTRICT.

Stallion.	Owner.	Address of Owner.
Boy Cole	W. E. R. Brocklebank ..	Felton, Greenmount
Concord	W. J. McDonald	Goombungee
J. J.	G. Jeppensen	Kingaroy
Mac Wilkes	H. G. Lohmann	Woodstock street, Maryborough
Prince Cole	W. E. R. Brocklebank ..	Greenmount
Sparkling Echo	L. B. Reese	Crown street, South Brisbane
Virginian	J. T. Scrymgeour	Warwick
Yankee Dexter	F. E. Willis	Kingaroy
Young Todd	R. Briggs	Annie street, Torwood

LIST OF TROTTING STALLIONS CERTIFICATED FOR THE YEAR 1926-27 IN THE SOUTHERN DISTRICT.

Stallion.	Owner.	Address of Owner.
Broadsound	J. W. Hart	Blackbutt
Crown Rex	L. B. Reese	South Brisbane

[illegible]

It might be mentioned that in the above calculation the output per capita in each year was recomputed by means of production prices index numbers, which have been obtained from the Commonwealth Statistician. The values in 1911 have been taken as a base and the figures for the later years adjusted therefrom.

It will be seen from this second table that the fluctuations have been slightly different from those at first apparent.

The Index Numbers.

In order that the relative productive activity may be more readily apparent, index numbers have been computed and appear below. In all cases the year 1911 has been taken as a base 1,000.

Year.	Estimated Value of Production.		Relative Value of Production per head 1911—1000.	Production price Index numbers 1911—1000.	Estimated relative productive activity Index numbers 1911—1000
	Total.	Per head of the population.			
	£	£			
1921 ..	50,278,000	65.53	1,539	1,579	975
1922 ..	51,411,000	65.61	1,541	1,753	879
1923 ..	57,321,000	71.15	1,671	1,850	903
1924-25 ..	69,936,000	83.77	1,967	1,880	1,046
1925-26 ..	63,318,000	73.52	1,726	1,836	940

Attention is drawn to the fact that the values of production shown herein represent the gross output of the several industries and not the return to the producer. Endeavours were made to ascertain this amount by estimating the charges which had to be borne by production, but at this juncture the facts gained are too unreliable to warrant publication.

Retail Prices Index Numbers (August, 1927).

The following retail prices index numbers based on the cost of food and groceries in certain Queensland towns have been made available by the Registrar-General (Mr. Geo. Porter).

The weighted average cost of the same commodities in the six capital cities of the Commonwealth in 1911 has been taken as a base 1,000.

Town	July, 1914.	August, 1926.	July, 1927.	August, 1927.	Percentage Increase from July, 1914, to Aug., 1927.
Brisbane	1,057	1,809	1,640	1,667	57.7
Charters Towers	1,246	2,042	1,999	1,987	59.5
Rockhampton	1,156	1,893	1,764	1,765	52.7
Toowoomba	1,041	1,791	1,566	1,587	52.4
*Townsville .. .. .	..	2,022	2,004	1,975	..
Warwick	1,083	1,810	1,695	1,719	58.7
Weighted average (5 towns) ..	1,082	1,824	1,659	1,681	55.4

* Not included in weighted average.

It will be noted from the above that there has been, compared with the previous month of July, 1927, an increase of 1.33 per cent. in the cost of the selected list of food and groceries in the five towns as a whole. Compared with the corresponding month of August, 1926, a decrease of 7.84 per cent. is noted.

The actual cost of the regimen of food and groceries for the month of August was highest in Charters Towers and lowest in Toowoomba.

The increased cost in the five towns as a whole since July, 1914, amounted to 55.4 per cent.

The average prices from which the above index numbers have been computed are shown in the accompanying statement.

RETAIL PRICES (FOOD AND GROCERIES) IN SIX QUEENSLAND TOWNS FOR AUGUST, 1927.

Commodity.	Unit of quantity.	Brisbane	Charters Towers.	Rockhampton.	Too-woomba.	Townsville.	Warwick.
		d.	d.	d.	d.	d.	d.
GROUP I—GROCERIES (Including Bread).							
Bread	2 lb.	5.75	6.50	6.00	6.00	6.13	6.00
Flour	25 lb.	57.20	72.00	64.71	66.43	69.60	67.10
Tea	1 lb.	25.50	29.40	26.57	27.00	27.40	29.40
Coffee	"	28.87	31.20	30.81	27.43	25.40	27.60
Sugar	"	4.48	5.25	4.75	4.75	4.80	5.00
Rice	"	3.40	4.15	3.57	3.93	3.60	4.10
Sago	"	2.83	4.00	3.07	3.43	3.70	3.90
Jams	"	7.98	9.70	8.21	8.71	9.05	9.20
Oatmeal	"	3.98	5.66	4.63	4.60	4.76	4.93
Raisins	"	10.60	12.60	8.86	9.43	10.20	11.40
Currants	"	9.15	10.60	9.14	9.29	9.60	10.20
Starch	"	8.80	12.20	9.71	10.86	10.20	10.80
Blue	dz. sqs.	11.65	17.80	15.14	12.00	17.00	15.80
Candles	1 lb.	10.65	14.60	11.50	10.29	13.40	12.20
Soap	"	4.56	4.80	4.21	4.79	4.70	5.00
Potatoes	14 lb.	23.60	31.00	23.00	23.00	26.40	24.60
Onions	"	1.48	2.63	1.57	1.82	2.00	1.70
Kerosene	1 gall.	22.50	26.44	22.56	26.71	22.65	29.20

GROUP II—DAIRY PRODUCTS.

Milk	1 qrt.	7.65	8.25	7.43	6.57	10.00	7.00
Butter	1 lb.	23.30	26.00	23.86	23.93	25.20	24.00
Cheese	"	15.10	19.60	15.71	14.86	17.40	17.00
Eggs	1 doz.	19.30	21.00	17.00	14.29	23.25	15.60
Bacon—middle cut ..	1 lb.	16.30	19.00	17.14	16.29	16.60	17.20
shoulder	"	10.75	16.40	12.71	11.57	11.20	13.40
Ham	"	27.29	27.25	26.50	26.00	27.00	26.00

GROUP III—MEAT.

Beef (fresh)—sirloin ..	1 lb.	8.30	8.50	8.79	5.86	9.90	7.20
ribs	"	5.45	6.00	7.00	3.86	6.30	5.30
flank	"	4.33	4.88	5.30	3.00	6.50	2.80
shin (without bone) ..	"	3.40	4.40	4.00	2.43	4.30	2.38
steak—rump	"	10.70	10.50	10.71	8.29	12.00	8.80
shoulder	"	4.95	6.60	5.57	3.71	6.60	4.60
stewing	"	4.15	6.20	5.07	3.57	6.50	4.00
buttock	"	5.78	6.70	6.00	4.14	8.20	5.20
Beef (corned), round ..	"	7.25	7.00	7.00	5.14	8.60	6.15
brisket (with bone) ..	"	3.60	4.40	5.10	3.64	7.00	4.30
" (without bone) ..	"	5.25	6.00	6.86	4.64	8.25	5.25
Mutton—legs	"	8.15	11.60	10.14	6.71	12.80	9.00
shoulders	"	5.35	7.80	7.57	3.50	8.00	5.60
loins	"	7.80	11.60	10.14	6.71	11.60	9.20
necks	"	5.75	9.60	6.0	4.07	7.60	3.60
chops—loin	"	8.40	11.60	10.14	6.71	12.80	9.60
leg	"	8.40	11.60	10.14	6.71	12.80	9.00
neck	"	7.56	10.80	9.17	5.17	10.80	5.10
Lamb—forequarter	"	7.00	9.00	7.33	7.33	11.00	8.00
hindquarter	"	8.63	9.50	9.33	9.83	13.33	10.00
Pork (fresh) leg	"	12.80	12.00	12.29	11.71	14.80	10.80
loin	"	13.00	12.00	12.29	11.57	14.80	10.80
belly	"	10.20	10.60	10.50	8.57	13.20	8.00
chops	"	13.50	12.00	12.29	11.86	14.80	11.00

These figures were compiled in the office of the Registrar-General, Brisbane, on 6th September, 1927.

PIG CLUB PROGRESS.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

Pig raising as an industry occupies a very important place in the agricultural life of Queensland, particularly in those districts on the coast, on the Downs, in the Burnett, and in the Central and far Northern districts of the State, where dairying and mixed farming hold sway, and where pigs are kept in conjunction with dairying and similar branches of agriculture.

In all of these districts, as well as in many of the fruit-growing centres and in centres comparatively close to the metropolis or provincial cities, numbers of boys and girls are growing up and are engaged in one or other of the jobs associated with the daily round of duties on the farm; this, in many instances, before they leave for school in the morning and on their return during the afternoon.

The problem we set out to face in the Pig Club Scheme is to give these girls and boys, and others interested, better ideas in regard to the breeding, feeding, management, and marketing of pigs of various breeds, grades, and ages.

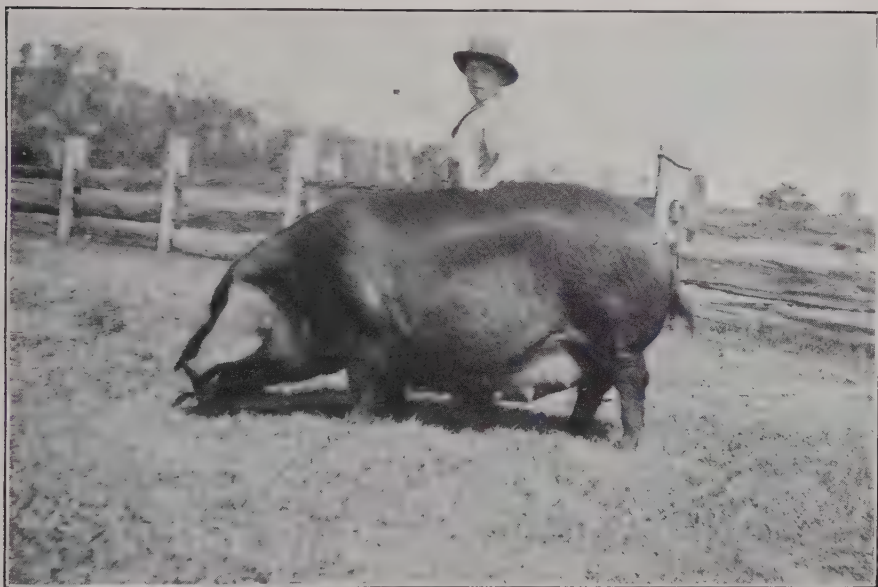


PLATE 111 (Fig. 1).—AN ENTHUSIASTIC PIG CLUB MEMBER, GEORGE DAVISON, JUNIOR, OF THE NORTH ARM PIG CLUB.

George is the proud possessor of more than 100 guineas' worth of stud stock. In the first instance, he won a Large Black boar, donated by Captain Calcott, a Victorian breeder. He afterwards, with the assistance of his parents, purchased the Large Black sow, "Wattle Violet," shown in this photograph, and with her won first prize at the Royal National Show, Brisbane, August, 1927. Her first litter, numbering nine pigs, were actually valued at more than 90 guineas, one boar alone realising 14 guineas at public auction. "Wattle Violet" is one of the best Large Black sows in Australia to-day, and her proud owner is in Pig Club work to stay. (See also Fig. 2.)

One of the objectives of this description of the progress made is to illustrate by photograph and by review that we have attained some measure of success and have, to an extent, justified the expenditure in time, labour, and capital involved in the organisation.

From copies of previous reports which are available in pamphlet and extract form (to those sufficiently interested to write for same), it will be learned that Pig Clubs were first introduced and tried out several years ago on the return from overseas of Mr. J. D. Story, I.S.O., Public Service Commissioner, who submitted a complete scheme of organisation of the Home Project Scheme and recommended that it be put into operation. In the initial stages the scheme was handled through

the Public Instruction Department, by the then Instructor in Agriculture, the late Mr. J. C. Stubbin, an official who travelled extensively and who gave the scheme much publicity. On the writer's appointment to the Department of Agriculture and Stock in 1923, the control of the Pig Club portion of the Home Project Scheme became part of the duties of the Instructor in Pig Raising, who immediately set to work to revive interest and extend the scope of operations of the club scheme to many new districts not previously touched or organised, and to many schools not previously visited.

Since then our itineraries have covered thousands of miles, hundreds of schools have been visited (there are more than 1,800 schools in this State alone), addresses have been given to thousands of children, and lantern lectures and practical demonstrations have been given wherever practical to both senior and junior farmers, and to women as well as the men and children.

Clubs have been formed in many districts and these clubs have embraced many schools. The extension of operations and the widening out of the scheme has necessarily called for more organisers and, in addition to the Assistant Instructor in Pig Raising (Mr. F. Bostock), and an understudy (Mr. J. Winders), in the Department of Agriculture and Stock, Mr. F. E. Watt, Organiser and Instructor



PLATE 112 (Fig. 2).—NORTH ARM PIG CLUB PIG.

Large Black Boar exhibited at Brisbane Royal National Show, 1927, by North Arm Pig Club. This boar, owned by Mr. George Davison, Junior, realised 14 guineas at public auction at the Stud Pig Sales. He represents the very best there is in the breed in Australia to-day.

in Agriculture in the Department of Public Instruction, has taken up the work, the latter engaging practically entirely in organising new clubs and in planning and assisting in carrying through club contests, club picnics, and other social activities associated with club life. Some forty or more clubs are in actual operation at the date of writing (September, 1927), these clubs covering approximately sixty schools and from 400 to 500 members.

None but those actually associated with the organisation of clubs and with their introduction into new districts have any idea of the difficulties to be faced or of the time involved in initiating pig clubs. Not only is it necessary to interest the school teachers and the children, but the parents have to be interested and to be convinced that the Pig Club Scheme is worth while, and a good business proposition that is going to put money into the pockets of the club members and not take too much out of the already busy lives of many of the school children.

At any rate, in face of all the difficulties, and as but one section of the many activities in which the Instructors engage, fresh clubs are being formed and new ground covered, while in practically every instance the initial club has proved to be

but the forerunner of other and more successful clubs, with keener competition and with better financial results. The club movement is certainly exercising a highly beneficial influence in the pig raising industry and, in that sense alone, is paving the way to better things.

In an interesting and informative "write-up" of the Queensland Pig Club Scheme by Mr. F. W. Lydiard (F.W.L.), a Victorian representative of the "Argus" and the "Australasian," in a recent issue of the latter Journal, the progress made and the efficiency attained is specially emphasised.

Mr. Lydiard's opinion is that the "Pig Club movement is making substantial progress and, as stated above, is already exercising a highly beneficial influence." Members of the various clubs are taking a keen and intelligent interest in the work, many of the children displaying evidence of their proficiency in pig keeping.

It is a noteworthy fact that, in every instance where the children have received encouragement, however small, the results have proved that, not only can pig clubs be established, but that they can be made to play an important part in the development of the districts in which they are operating.

The Extension of the Scheme.

It is our objective to visit every school in those sections of the State suited to dairying and pig raising, to give lectures and practical demonstrations and to enlist the co-operation of both teachers, parents, and scholars, in the endeavour to initiate pig clubs (and other branches of the Home Project Scheme) in as many schools and districts as possible.

Considerable publicity has been given and is being given to the scheme, with benefit to all concerned, while many very satisfactory animals have been prepared for exhibition by pig club members. These animals, when brought together at local or district shows, have created a great deal of enthusiasm and healthy rivalry and have been the means of indirectly benefiting members financially and otherwise.

In the course of official inspection of the pigs owned and cared for by club members, it can honestly be said we rarely see an inferior animal. It can, with equal truth, be stated that in 99 per cent. of cases the pigs are accommodated and provided for in a manner much superior to that seen on farms in the majority of the districts throughout the State.

With us pig raising is essentially a crop-growing and farm foods utilisation proposition, hence the lessons to be learned are not only those associated with the actual handling and marketing of the animals, but more especially with cheapening the cost of production and with the more efficient control of the pigs on the farm. This is, in itself, a very big proposition and a very important one in a State like Queensland.

That pig clubs should become the medium through which many new purebred pigs will be introduced into the various districts is also one of the objectives of the scheme; in fact, this aspect of the business is specially emphasised and dealt with at length at all pig club gatherings, this particularly so as it is the objective throughout to so design the clubs that they will be of assistance to the children of the men on the land. With the objective of further assisting in the development of the purebred business, donations of purebred pigs have been made to a number of clubs, the selected animal usually being offered as a special prize in either the purebred classes or in the prime bacon pig classes.

The Department of Public Instruction, through the Queensland Agricultural High School and College, have, in this way, donated twenty purebred pigs to date, these pigs being distributed in various districts throughout the State.

Where possible, club members are urged in an endeavour to reduce cost of production to grow as much of the green food and root crops as they can, this being a very important feature in mixed farming districts. It not only teaches the club members the value of the farm foods utilisation part of the industry, but gives them a better knowledge of practical agriculture as it applies to pig keeping.

That "Cleanliness is next to Godliness" needs no emphasis, hence special stress is laid on the importance of sanitation and hygiene in and around the piggery. The pig is a clean animal if given a chance and if kept in surroundings favourable to development. That there is money in pigs if they are efficiently handled and bred along the right lines is also stressed, this being one of the cardinal points in the club scheme.

That co-operative effort pays is also prominently brought before the children, for the club scheme is a community organisation and as such has a bearing on the whole of the residents in the district.

This co-operative effort not only applies to the community interest, in so far as it relates to the production and marketing of the pigs, but in its relation to the exhibition of the competing animals at club contests and Agricultural Shows. Indeed, many Show Societies have given the movement their heartiest support and have quite readily supplied suitable accommodation and a schedule of classes. On occasion, these societies have offered silver cups, gold and silver medals, printed prize ribbons, trophies, and cash prizes. For all of these the entry has been liberal and competition keenly contested.

On numerous occasions, enthusiastic breeders in this and the other States have made liberal donations of stud stock, cash, and trophies to the club scheme; these donations have created very considerable interest and we have definite evidence that they have been instrumental in building up the pig industry in this State. (See Figs. 1-6 inclusive.)

In the instance referred to in Fig. 1, a few additional details will serve to illustrate the point under review.

The club member referred to, George Davison, junr., of North Arm, won a Large Black boar at the North Arm Pig Club contest in 1926. This was followed



PLATE 113 (Fig. 3).—BERKSHIRE SOW, "DARTMOOR SARAH."

Purchased at Brisbane Show Sales by Mr. Geo. F. Davison for his daughter Eileen, also an enthusiastic Pig Club member of the North Arm school. George, junior, is here seen caring for this young sow while she poses for her photograph. The farm property and homestead, aptly called "Fair Hill," is in the background.

up by the purchase from Victoria of the sow "Wattle Violet" at £28, from whose first litter, farrowed a few days after arrival in Queensland, the following pigs were secured:—

	£	s.	d.
2 Sows sold at 6 guineas each	12	12	0
1 Boar still for sale, valued at	8	8	0
3 Sows retained for breeding purposes and valued at 6 months old at 15 guineas each	47	5	0
2 Sows sold at 6 guineas each	12	12	0
1 Boar sold at public auction	14	14	0
Total, 2 boars and 7 sows realised	£95	11	0

The sow, "Wattle Violet," is still worth more than 30 guineas, while the boar, "Wattle Bruce," originally donated, is certainly worth more than 20 guineas.

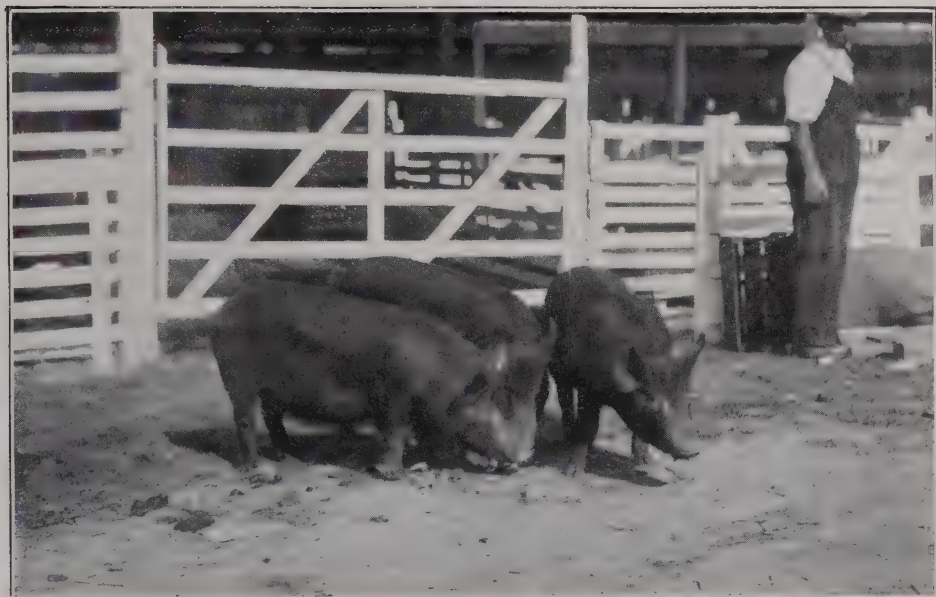


PLATE 114 (Fig 4).—POMONA PIG CLUB PIGS.

First Prize, trio of Tamworth Baconers, exhibited at Brisbane Show by Pomona Pig Club, the pigs being the property of the Alford boys from Traveston. Two of these pigs (sows) were sold as breeders, the other (a barrow) realising top bacon pig price at the factory.



PLATE 115 (Fig. 5).—JUNIOR PIG CLUB ENTHUSIASTS.

A snapshot from Allendale, Kureelipa, the home of the Cordwell boys, of whom three are members of the Mapleton District Pig Club. These juniors are keenly interested in "Better Pigs on Every Farm," their pigs seeming to be equally content with better conditions.

In connection with the sow "Wattle Violet" it is interesting to note the following extract from a letter received from the Davisons, at North Arm, under date, 19th September, 1927:—

"You will be pleased to hear that 'Wattle Violet' has another lovely litter of nine pigs just a few days old—six sows and three boars. The boys are taking great care of these young pigs in the absence of their Dad, who is away in the South. Several of these pigs have already been booked at £6 6s. each as soon as they are ready to send out, which will be about Christmas time."

Another instance worthy of note forms the subject of Fig. 6, the Cordwells, of Kureelpa. These people are in club work to stay, and are convinced that the scheme should be extended wherever possible. Mr. Cordwell assured me that his farm revenue had increased by more than £100 per annum since his boys have taken up



PLATE 116 (Fig. 6).

The Cordwell boys of "Allendale," Kureelpa, members of the Mapleton District Pig Club, with their father Ex Constable W. Cordwell, all workers in the Pig Club movement and all determined to make a success of the venture. Mr. Cordwell assures us that better pigs on his farm have increased the farm revenue by more than £100 per annum in the initial stages of development.

pig club work and have introduced better pigs. They are now the proud possessors of a herd of registered Poland-China pigs.

Another instance worthy of special note is the case of the Roy boys at Palmwoods, sons of Mr. and Mrs. C. F. A. Roy. These boys won a Middle Yorkshire boar "Kyabram Crystallograph," donated by Mr. Ralph Joyce, a noted Victorian breeder. This boar was won at the Nambour Show, 1926. Later in the year, they purchased from another club member, who was compelled by reason of circumstances to sell, a pedigreed sow also donated by Mr. Joyce and won at Nambour Show. This sow, in due course, farrowed a very fine litter, from which eleven pigs were reared. Of these, several were prize winners at Palmwoods, Nambour, and Brisbane Shows and were in all valued at from 3½ to 6 guineas each. The boar was finally sold at 15 guineas in order to secure unrelated blood and, writing under date, 20th September, 1927, Mr. Roy states that the sow "Kyabram Present" is expected to farrow again in a few days' time and shows promise of producing a very fine litter.

Fig. 4 also illustrates a pen of prize-winning baconers owned by the Alford boys, members of the Pomona Pig Club.

Numerous other instances could be recorded if space permitted to demonstrate the value of pig clubs in the actual building up of the pig industry.

Lessons Learned by Pig Club Members.

It has been the objective of the organisers of the Pig Club movement in Queensland to so tabulate results that they will appeal both to the club members as well as to their parents, and that they will prove of educational value to others interested in reading up the subject.

It is interesting to note that club members have learnt many valuable lessons as a result of their experiences in club work. In one instance we "listened-in" to a conversation between two club boys. One said to the other, "Look here, Teddy, if you don't keep your pig clean and the pen nice and comfortable, he will get that disease which so many farmers seem to have had to fight. We club members are quite convinced that unless we keep our pigs and their sties and surroundings clean and in attractive order, we might as well be out of the club, for our pigs will have no hope of winning against those kept under more favourable conditions."

It has been noted that the members have learned that pigs will not thrive and prove profitable when they are infested with lice and intestinal worms; they have learned that a good pig paddock is an absolute necessity in any system of pig keeping and that the provision of green food is equally necessary.



PLATE 117 (Fig. 7).—AN OLD-STAGER IN THE PIG BUSINESS IN QUEENSLAND.

Mr. Harry Severns, the venerable pig expert for many years in charge of the Stud Piggery at the Queensland Agricultural High School and College, Gatton. "Hairy" has been attending and exhibiting at Agricultural Shows throughout Queensland for more than forty years and has many championships and other coveted awards to his credit. He is still full of vim and as keenly interested as ever in winning a championship and in thus adding further laurels to the College herd.

Incidentally, they have been taught something about the diseases from which pigs suffer and of the economic loss resultant to the industry through condemnations at slaughter, through bruising and damage in transit, and through the numerous losses prior to the stage at which the pigs are prepared for the fattening or "topping-off" period. It is not, of course, expected, as a result of membership in one pig club, that a child can be turned out as an expert pig farmer. It is hoped, as time goes on, to make club work continuous, as far as is possible, and that commencing in the first instance with a pig at, say, weaning stage the club member will prepare the pig for a pork or bacon pig competition. Once having proved that they can successfully manage this part of the scheme, it is hoped, in the following season, to initiate them into the breeding sow competition, in which the member would start off with an in-pig sow or a sow approaching ten or twelve months of age and ready to be mated, and to carry this sow on through the gestation period to the time when the young pigs are born. We may even take up the Litter, Weight, and Bacon Pig Carcass Competition Schemes which created such a wonderful amount

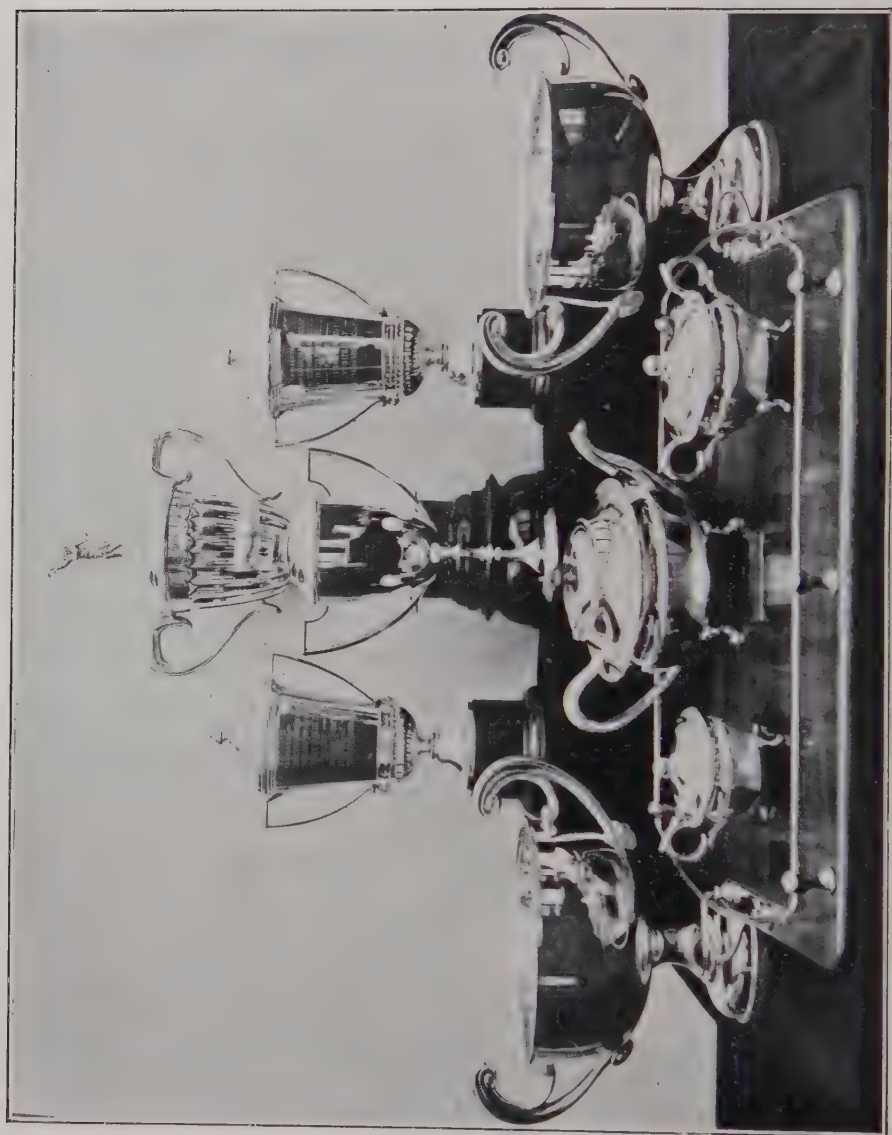


PLATE 118.—(For Description of Plate, see page 405).

of enthusiasm at this year's Brisbane Show. In due course, as a result of this training, it is anticipated that the senior members will enter young judges' competitions at agricultural shows and that, later on, they will be the proud possessors of and exhibitors of stud pigs and of other stock at the various shows throughout this and the sister States. A Breeding Sow Competition, the first to be started in Queensland, is at present in operation at the Jarvisfield Pig Club in the Ayr district of North Queensland.

The scheme has boundless possibilities. It needs careful handling and consistent support. It should be effective in teaching the children the value of farm life and the advantages of rural vocations. We have striven to teach the children the necessity of method and of the value of record keeping, even if the club records are kept only in a school exercise book. We hope some day that many of them will become active members of the Australian Stud Pig Breeders' Society, an organisation of immense value in the uplift of this particular industry. A constant effort has also been put forward to impress upon the minds of the parents that the pig club movement is here to stay and that, if the children are to become club members, they (the parents) must be prepared to co-operate; the children must be prepared to work and to keep on working, for pig raising is an industry which demands constant attention and a very much wider practical knowledge than many folks imagine.

That there is "Money in Pigs," there is not the slightest doubt at all, but club children have found that their margin of profit is considerably reduced, if not wiped out altogether, if they pay too liberal a price for store pigs when they join up as members of the club.

Unfortunately, thousands of farmers throughout Queensland have suffered financially and are still suffering by reason of the same cause, for the prices paid for store pigs—i.e., pigs that are purchased when quite young for fattening purposes—are frequently out of all proportion to the price finally realised for the pigs when they reach the factory. This lesson alone is one which should prove of untold value to club members.

PIG RAISING AWARDS.

(See Plate 118, page 404).

The pig section at the Royal National Show at Brisbane continues to attract attention, each year's Exhibition proving of greater interest than its predecessor.

This year quite an array of silver cups and trophies were offered for competition, with numerous cash prizes, ribbons, and prize cards. Competition in most of the sections thus competed for were keen and evenly contested.

Details of the silver cups and trophies illustrated on page 404 are as follows, with details of donors and winners:—

Front Row.—Silver tea and coffee service, presented by R. G. Watson, Esq., Stud Pig Salesman, Inns of Court, Adelaide street, Brisbane, for the most successful exhibitor in the pig section, won by Mr. H. Franke, of Cawdor, Crow's Nest Line.

Second Row (Left).—Silver cup, presented by David Webster and Sons, Ltd., Annerley road, South Brisbane, in the bacon pig carcass contest, won by Percy V. Campbell, Lawn Hill, Lamington.

Second Row (Right).—Silver cup, presented by David Webster and Sons, Ltd., Annerley road, South Brisbane, for boar and his progeny (Poland-Chinas), won by Queensland Agricultural High School and College, Gatton, Queensland.

Third Row (Left and Right).—Silver cups, presented by the National Pig Breeders' Association, London, for the best Tamworth boar and the best Tamworth sow exhibited, both won by the Queensland Agricultural High School and College, Gatton.

Centre.—Silver cup, presented by Messrs. Cribb and Foote, Ipswich, for Tamworth boar and progeny, won by the Kingston Pig Farm Co., Kingston, Queensland, Mr. R. G. Watson, proprietor.

Back Row.—Silver cup, presented by the Estate of the late W. J. Warburton, Northgate Junction, for Berkshire boar and progeny, won by Mr. H. Franke, of Cawdor.

The Empire Challenge Cup, presented by the British Berkshire Society for best Berkshire boar, was won by Mr. H. Franke, of Cawdor.

The Empire Challenge Cup for Berkshire sow, presented by the British Berkshire Society, was also won by Mr. H. Franke.

These cups, trophies, and the other numerous prizes presented are of considerable value in creating additional interest and in inducing added competition.

Further donations of similar trophies will always be appreciated by exhibitors in the pig section.

QUEENSLAND OVERSEAS.

A description of the New Zealand and South Seas Exhibition at Dunedin, under the title of "Queensland Overseas," by Mr. H. W. Mobsby, of the Department of Agriculture and Stock, the Queensland Government Representative at the Exhibition, broadcast recently from 4QG, was heard distinctly in New Zealand. Mr. Mobsby, in addition to an appreciative cable from some prominent citizens in Dunedin, has since received a number of letters and press references to his talks which indicate the widespread interest they aroused in the Dominion.

Commenting on his initial address the Dunedin "Evening Standard" had this to say:—

"Last night several of Mr. H. W. Mobsby's Dunedin friends listened-in to an address broadcasted from 4QG Brisbane. Mr. Mobsby, it will be remembered, was the Queensland Government Commissioner at the New Zealand and South Seas Exhibition, and it was obvious from his remarks last night that he still retained vivid and pleasant recollections of his stay in our midst. Mr. Mobsby's talk was all about our Exhibition, and he spoke in terms of admiration of the organising and business ability displayed by those responsible for it. He also referred to the wonderful work of the Otago Harbour Board in reclaiming Logan Park, to the gift of the Art Gallery to the city by Mr. and Mrs. P. R. Sargood, and to other features of our life here which struck him as being particularly praiseworthy in view of the size of the community. The whole address was distinctly heard, and at least one group of listeners-in who had personal acquaintance with Mr. Mobsby despatched a cable to him immediately, announcing the clear reception and extending the good wishes of his Dunedin friends to the speaker."



PLATE 119.—VIEW OF THE NEW ZEALAND AND SOUTH SEAS EXHIBITION, DUNEDIN, NEW ZEALAND, 1925-26.

"A GOOD, USEFUL JOURNAL."

A Eudlo farmer writes: "My friends in England say we are lucky farmers to have such a good, useful Journal offered so cheaply. When finished with I post the Journa' home."

RURAL FIRES.

By E. H. F. SWAIN, Chairman, Queensland Forestry Board.

The firestick habit in Australia commenced with the aborigine, who made concentrated hunting grounds by setting fire, in winter time, to the ungrazed dry grass in patches. To these patches game would be lured by the new green shoots that followed the burn, whether it rained or not, and there they were readily found and speared. The white pioneer in his turn discovered that his cattle became hidebound when feeding on the old dry grass accumulations, and that by using the aboriginal method he could materialise with fire a new crop of herbage, rich in mineral salts, upon which his cattle thrived, their bowels loosening and their coats softening. Similarly in consuming the trash of his forest clearings, the new selector found fire to be a settler's blessing. The use of fire in converting forests to farms and as an ever-ready and cheap method of pasture cultivation. This became a white man's habit and since then Australia has been burned and grazed and burned and grazed as it never was burned and grazed before. At this stage the rural population is so enamoured of the use of fire in converting forests to farms and as an ever-ready and cheap method of of in the winter time, the bushman blithely distributes his matches and the schoolboy is learning to follow in father's footsteps.

I am reminded of the history of the discovery by the Chinese of the merits of roast sucking pig, as related by Charles Lamb. A Chinese peasant lamenting the total destruction of his home by an accidental fire suddenly noticed a delicious aroma proceeding from the ruins. Investigation disclosed an incinerated pig. He was impelled to taste the flesh, and called his neighbour in to participate. They were so impressed that an epidemic of incendiarism set in, people burning down their homes in wholesale fashion in order to realise the delights of roast sucking pig. Much destruction of life and property resulted from the growing practice of pig-roasting until some Chinese genius worked out the theory of the cooking oven, with which the advantages of the new dish might be extracted without incurring the cost of the previous procedure.

The Fire Hazard in Queensland.

The Australian practice of indiscriminate firing is not very different from the original Chinese method of roasting pork. The fact that the Chinese were successful eventually in isolating the advantages of fire from its disadvantages, leaves me hopeful that we in Australia may be equally successful eventually in the matter of our rural burning activities. With the development of closer settlement, the building of homesteads, the making of improvements, the ringbarking of the hardwood forests and the consequent thickening of the pasturage, the accumulation of slash in the logged-over timber reserves, the ringbarking of useless trees during the improvements of our hardwood forests, and the felling of scrub for our new plantations, the fire hazard in Queensland is going to assume most formidable dimensions in the future, and we in forestry are concerned for the safety of the new softwood forests which we have begun to establish against the prospective needs in wood of the State.

The Teaching of Forestry.

Quite apart from the incidental dangers of fire use, firing is not an unmixed blessing, and indeed may be like strychnine—a stimulant in small doses, and a poison in big. The teachings of forestry are that fire damages the hardwood stands, perceptibly and imperceptibly, in root, bole, and branch, the winds break off the dead and brittle timber, gum veins develop and white ants gain ingress to the heart of the tree, so that most of our Eucalyptian hardwood trees are hollow, and the financial losses resulting to the Forestry Department, the timber-getter, the sawmilling industry, and the community at large can be measured only in hundreds of thousands of pounds annually. Also, whilst it is true that the widespread firing of the bush by the white pioneers in this country and the resulting grazing of cattle cleared off the heavy grass accumulation in the original park-like Eucalyptus forests, and permitted a new generation of Eucalyptus poles to thicken up the stands so that it is no longer possible to hunt kangaroos at a hand gallop through the bush, it is also true that the recurrent fires have decimated and damaged this regeneration and assured us of a further crop of white-ant infested logs for the future. But whilst the Eucalypts by their hardiness do at least survive and continue to reproduce, the more delicate Hoop and Bunya and Cypress pines are killed by the first whiff of fire, and it is not too much to say that the smallness of our softwood resources and our consequent softwood

shortage has been accentuated by the Australian bush fire habit. Hoop and Bunya and Cypress pines ordinarily come into the forest mixture as an underwood to the Eucalyptus trees, and the succession is then through shrubbery to jungle. Had there been no fires in Australia it is certain that the Eucalyptian woodland would have been succeeded to a large degree by extending stands of Hoop, Bunya, and Cypress pine, and that Hoop pine would be found further westward than it occurs to-day.

Moreover, our areas of agricultural land would have been more extensive than they are now because the pine trees and their associates enrich the soils. It is a teaching of forestry that the forest humus represents fertility, that its production and conservation on the forest floor means greater response in tree growth, and that its destruction or removal produces a stale and unprofitable stand.

The Farmer May Learn from the Forester.

In these connections, agriculture has something to learn from silviculture. The continued firing of the farm lands, the exposure of the soil to slow sterilisation of the sun, the compacting of the surface by rain, all these things are mopping up the fertility fund of the country, the basis of its prosperity.

The selector and the surveyor appraise the value of the soil according to the vegetation which it sports. The fact that vegetation too often is really only the fire survival of the site shows that the sterility of the site is not so much to be condemned as the fire which helped to make it so.

The fertility of banana lands continues for only five or six years and the depreciation of the farm is ascribed ordinarily to the high demands of the banana plant upon the soil, but the original burning off of the forest lumber, despite the temporary stimulus given to the soil, combined with the subsequent exposure to sun and rain, have probably as much to do with the early deterioration of the site as the species demands. A successful application of silvicultural principles to rubber plantations recently recorded in the "American Journal of Forestry" confirms this view. On Fraser Island, our experience has been that the initial burn has incinerated the humus and that the new forest stagnates until the weeds have come to the rescue and restored the coolness and humidity of the soil by their shade and humus. Apart from the losses to the country resulting from the destruction by fire of material improvements such as fences and house and telegraph lines, and of badly needed grass in drought time, and in the diversion of labour from profitable occupation to fire extinction, I am satisfied that a strong indictment can be made out against constant firing on general grounds. Expecting when I came to Queensland to see a land of humid jungle, the most vivid first impression made upon my mind was the baked and burned appearance of the land, except in the moisture basins of the coast where the congregations of damp scrub vegetation have protected them from the fires which seem to have ravaged the rest of the landscape. From the point of view of my silvicultural lessons I cannot but feel some apprehension for the continued agricultural fertility of the soils of Queensland if they are to be continually burned.

Fire Control.

There can be no question of trying to prohibit the practice of rural firing. The issue is rather one of fire regulation and control, and having in mind the values which in the future will stand in danger from the unbridled employment of the individual firestick, I am convinced that the appointment of this committee is opportune, and that the time has arrived for the State itself to assume the responsibility of organising and supervising rural firing and of safeguarding the general estate from damage and loss. The issue is clearly one of community and not of individual concern, and I take it that the first step is to place the individual fire lighter under community restraint.

To this end I suggest the establishment, under the Ministry of Public Lands, of a Rural Fires Bureau, to be charged with the administration of a new fire code the substitution and extension of the Careless Use of Fires Act, which, dated 1865, is little more than a police measure and lacks the conception of administration.

The purpose of the new code should be the organisation and supervision of rural burning-off operations in the community's interests. It can be officered from within the Department of Lands. Under such a code the State might be partitioned into Rural Fire Districts in charge of a Rural Fires Warden who might be the Land Commissioner, or in a forest district, as on Fraser Island, the District Forester. Under the Rural Fires Warden, the Land Rangers, Forest Officers, Crown Land Bailiff, Police and other gentlemen might become Rural Fires Rangers organised as district patrols under the Rural Fires Warden.

A Rural Fires Organisation.

In such manner a Rural Fires Organisation can be set up so that public opinion may know upon whom to fasten responsibility for the control and extinction of bush fires. At present there seems to be no real responsibility vested in anyone, and this is the fundamental defect in the present arrangements.

For the greater part of the year the Rural Fires Organisation would be inactive. It need operate actively only around the periods of high fire hazard, when the aridity is greatest—that is, ordinarily, towards the end of winter and until the commencement of the summer rains. The length of the fire hazard period will depend upon the seasons and the district, and in drought years when the aridity is greatest the period naturally would be longer.

I think that the basis of the fire code should be the declaration by districts each year of a period of fire hazard during which the fire code would be in active operation. During such periods of fire hazard, which would vary according to the region, all burning-off operations should be prohibited except such as may be specified by the Rural Fires Warden, such as the firing of felled timber where artificial grasses or crops are to be sown after the burn. The permission to burn, whether granted by individual permit or by general declaration, should be conditioned according to regional necessities, but one condition should be compulsory notification by the lighter of the Warden and of his neighbours.

A central principle of fire code should be that each landholder is responsible for fires, whether authorised or accidental which break out on his land, and that such responsibility involves both notification of neighbours and Warden and of confinement of the fire to within his own boundaries.

Each landholder should be held responsible up to a specified maximum for damage done by fires which escape from his land.

There appears to be no other manner of bush fire control than to share out the responsibility in this way under an organised scheme. The first law of bush fire control is prevention and the second the earliest possible detection and suppression.

Incendiarism should be punished by arrest and imprisonment, but as incendiarism can seldom be proven against an offender there should probably be provision for arrest as suspicious characters of trespassers discovered in front of a trail of unauthorised fires. During the fire hazard season no person should be allowed to enter Crown lands without a permit of some kind, and permit holders or timber operators should be required to accept for the area of their operations the fire responsibilities attaching to a landholder or lessee of land.

Wax matches might also be prohibited during the close season, and the being in possession of wax matches during such season might be made an offence under the fire code. One effect of the prohibition would be to remind people of the existence of a fire code.

Fire Prevention.

The earliest possible suppression of small bush fires is the best method of preventing big ones. A small fire may burn for weeks without becoming a danger until a period of high aridity and fanning breezes ensues and converts the small fire into a self-motived conflagration developing its own impelling draught.

I understand that the Benarkin forest fire was burning untended on private land adjoining for a fortnight before it became a conflagration and swept through the State Forest defences. In fire fighting the best method of defence is counter attack, and the fire should have been extinguished on private land at the beginning. In such cases and for the purpose of defending his property from damage, a landholder might well be authorised to enter his neighbour's property to extinguish a menacing fire or to counter-fire it.

Despite close seasons and fire permits and notifications, and the vesting of responsibility in individual landholders, fires will be lit and responsibility will be denied. In such case, I think it fundamental that the Warden should be vested with power to extinguish unauthorised fires at the cost of the landholder. Such a provision will deter the lighting of such unauthorised fires, compel their tending and extinction, and bring about an automatic conformity to the code.

The Rural Fires Bureau should be authorised to issue leaflets, fire posters, and fire warnings, and to resort to publicity in order to develop a fire conscience in the community. The code should contain a provision that each box of matches sold during the fire season should bear a fire warning to be drafted by the Rural Fires Bureau.

The Warden should arrange for proper fire patrol of his region during the close season and for the supervision of permitted burning. Land Rangers, Forest Officers, and Police will constitute the nucleus of the patrol force.

There need be no distinction in law between Crown lands, State forests, and private lands so far as the fire laws are concerned. The same restrictions and responsibilities should apply all round. The code should aim directly for its objective, which is that fire should be the servant of the State—under delegation to the individual landholder for his specific purposes—and that the landholder or occupier should be responsible for the actions of his servant. There can be no fire regulation unless responsibility is attachable to the user.

Forests not Fireproof.

So far as forestry is concerned, foresters realise that forests will always be inflammable and can never be made fire-proof by fire-breaks. If the ideal of silviculture is to be realised the forests will be rendered even more inflammable than they are now, because debris will be allowed to accumulate in the belief that it represents fertility and makes for fast development of the wood crop. The desire of the forester is to exclude fire entirely from the growing crop.

It has been suggested that in the case of Eucalyptus forests the ideal of fire exclusion and humus accumulation should be dropped, and slow burning in winter time or at night time adopted in order to render the stand fire-proof. Whilst this compromise is better than unrestrained dry-time burning, it still strikes at the gospel of the silviculturist. Forestry does not want to resort to this compromise if it can be avoided, and so far as is humanly possible it wants to conserve the forest fertility instead of consuming it. After all, bush fires are lit, wilfully or carelessly, by individuals, and the first point of attack upon the forest fire problem is to "swat" the incendiary, to put the fire fool under restraint, and to regulate and control legitimate rural firing. When that is done it may be possible to deal with the then reduced loose fires by defence. With the issue of forest fires is bound up the question of forest grazing, and this opens up the issue of disposing of the forest pasturage, most of it by leasing on agistment, and a modicum by direct departmental grazing. In this connection grazing and Eucalyptus silviculture are bound together, and, as well as road-fire-breaks, we will set apart the boundary compartments for winter burning to act as fire-breaks and grazing forests whilst we practice the ideal of humus retention in the inner areas of the forest.

LEMONS.

Lemons should be cut from the tree when showing the first indication of colouring. In cutting, an orange clipper is most suitable, its shape admitting of severing the stem close to the petioles. The gathered fruit is then stored without being subjected to undue pressure—consequently not more than three or four deep—in a covered airy situation for about a fortnight to allow evaporation of skin moisture. In consistently dry districts no further treatment is necessary beyond wrapping, casing, and storing in a cool situation, but where atmospheric conditions are frequently changing, storing the fruit in dry fine sand has been found the most satisfactory, sufficient sand being used to prevent actual contact of fruit. Petrol cases may conveniently be used for this purpose. The fruit should be gathered in fine weather during afternoon sunshine. Careful handling is most essential.—GEO. WILLIAMS, Acting Director of Fruit Culture.

AN APPRECIATIVE CORRESPONDENT.

Thus a correspondent writing under date 8th September, 1927: "In the package of agricultural literature received safely to-day, my request of a few days ago has brought a reply that I dared not hope for. Needless to say, I much appreciate your kindness, and you can be assured that the perusal of same will give me much pleasure. The only 'fly in the ointment' is that a casual glance through shows how agricultural science has extended, how little I know, and how much accumulated rust I must knock off."

PRIZE-WINNING QUEENSLAND BUTTER.

The Minister for Agriculture and Stock, Mr. W. Forgan Smith, informed the Press recently that he was highly pleased to read of the success of the Queensland dairy factories at the Melbourne Show. He desired to congratulate the management of the Oakey District Co-operative Butter Association, the Downs Co-operative Dairy Association, and the Pittsworth Dairy Company, whose exhibits of butter and cheese had added further laurels to Queensland manufactures of dairy produce. The gaining of first prizes in the competition in Melbourne, whereat factories from each of the dairy-producing States of the Commonwealth had exhibited, indicated that methods of manufacture here were quite abreast of those in the Southern States, and he hoped that it would inspire the manufacturers to make increased efforts to improve the quality of their output, for by so doing the returns to the producers of the raw products would be enhanced, and the reputation of Queensland dairy products on the overseas markets would be further improved.

THE ARTIFICIAL COLOURING OF CITRUS FRUITS.

By D. B. FERGUSON.

It must be obvious to all that well-coloured oranges and lemons will command a higher price on the market than those in a semi-green state. This would apply to a much greater extent on the Southern markets.

Queensland growers no doubt realise that their fruit is fit for domestic purposes many weeks prior to attaining the degree of colouring that the market desires. Citriculturists who have had experience in various citrus-growing localities will agree that oranges grown in the cooler regions have ample colour long before they attain sufficient sugar to make them desirable for eating purposes, while those produced in warmer climates are sweet and luscious for some time prior to taking on the deep orange appearance which commands the higher price on the market. There is ample room in the Southern States for the production of fruit for the late market, and as the producing cost is somewhat less in those districts, the Queensland grower would be well advised to devote his attention chiefly to the supply of early fruit, and consequently he would reap the advantages of the high prices prevailing in the early part of the season. Hundreds of bushels of sweet oranges can be found in our groves during the month of April, and if these had colour together with a freedom from blemish, sugar, juice, and an attractive pack, all of which are features which command higher prices, they would be worth up to 30s. a bushel during that month and also the month of May.

Method.

Oranges and lemons, provided they have reached a state of maturity, can be coloured with very little expense in a short space of time.

A gas-tight room is required; in size it may be large or small. This would depend upon the quantity of fruit which the grower desires to colour each four or five days. It need not be an expensive structure; the roughest of timber would serve, provided it was lined with paper or any material which would prevent the escape of gas. The fruit, after being harvested, is placed loosely in lug boxes. A size which is capable of holding about a bushel is the most convenient. It is essential, however, that these are of a design which will allow the gas to circulate around the fruit when the boxes are stacked one on top of the other. They may be constructed with spaces between the boards on the side, with lugs across the top which will prevent one box from sitting tightly on top of another. The ordinary kerosene case could be used satisfactorily if opened on the side and 2 x 1 in. slats attached at each end of the opening. There should be a space of two inches between each stack of boxes and the wall to provide space for the gas to move freely. The next procedure is to produce the colouring agent. Any form of carbonic acid gas will do. This in California is put up commercially in cylinders, but prior to this recent development the exhaust from a motor and the burning of kerosene lamps were the general methods adopted for the production of gas. If the motor is used a pipe is taken from the exhaust and passed into the colouring chamber through a hole in the wall. If lamps, it is merely a matter of burning the ordinary kerosene wick type.

A chamber 20 ft. by 20 ft. by 12 ft. high would require three of the circular burner type of lamp similar to those used in the kitchen. These, of course, can be purchased, less fittings, and are not an expensive item. In short, it is replacing

the oxygen in the chamber with carbon monoxide and carbon dioxide which brings about the change in colour.

The time required is from three to five days. The writer is in doubt as to whether it is known actually what happens within the tissues of the rind. The process, however, has no ill effect upon the pulp of the fruit.

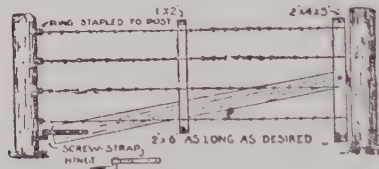
In order to preserve the keeping qualities, it is advisable to avoid atmospheric moisture and also keep the temperature as low as possible. After the lamps have been burning for some time, they will go out. This is due to the absence of oxygen in the air—that having been burnt—but the colouring process continues. They should be relighted twice daily. The lamps should be prevented from smoking, as this causes soot to settle on the fruit which is somewhat difficult to remove.

Market Standards.

There are periods in the year when the lemon market becomes glutted, and it would naturally follow that lemons were most plentiful. Green fruit will keep considerably longer than that in a ripe state. In localities where fruit will keep a grower may overcome the glutted market problem by harvesting immediately the crop reaches maturity and storing until prices are better, when the fruit can be quickly coloured and placed on the market. In different parts of the world where this treatment has been practised, it has also been abused in some cases, in that fruit in an immature state has been coloured and forwarded to the consumer. This, of course, has a detrimental effect on the industry generally. It is rather lamentable that such growers should exist. The difficulty, however, was overcome in California by setting a sugar standard for all oranges going to the market.

AN IMPROVED WIRE GATE.

Our earlier settlers who satisfied themselves with the usual wire gate, will recognise in this illustration, from the "Country Gentleman," United States of America, an advance on the general construction of this gate. This gate may be



readily made of split timber, and the bending of straps of the iron hinge is not difficult. The weight of the stay or strut will keep the wires in position and fairly taut. Of course, the lateral or side swing of the gate when it is being opened or closed remains a great objection to the use of the unframed gate.

THE JOURNAL IN HOLLAND—A REPEATED DEMAND.

Professor J. K. Murray, of the Queensland University, and Principal of the Queensland Agricultural High School and College, writes: "I am glad to be able to forward the enclosed appreciative letter in regard to your Journal." The enclosure is a letter from the State Agricultural Library, Wageningen, Holland, in the course of which the writer, among other complimentary references, says: "There is a repeated demand here for the 'Queensland Agricultural Journal.' As this Journal seems not to be complete in any of the public libraries of our country, we will be much pleased to purchase it for our library. . . ."

Answers to Correspondents.

A Tourist's Criticism.

A CORRESPONDENT (Brisbane)—

We had an opportunity of meeting the distinguished visitor from England when he was here, and were not at all impressed by his superficial knowledge of Australian problems. He evidently came here with preconceived notions of Australian life and industries, and they were not modified by his closer acquaintance with Australian conditions during a very hurried tour through the Commonwealth. His statement, for instance—"I have not seen a first-class banana in Australia" is evidence of his bias; especially when Queensland-grown fruit was being marketed in Sydney as "first-class Fiji bananas" at 3d. each. Those engaged in the trade know that Queensland bananas for quality and flavour are not surpassed by the product of any other country. There are other remarks of this visitor obviously based on misinformation; consequently we do not feel called upon to give further publicity to his statements, which display lack of essential knowledge. All the same we appreciate your kind interest in the Journal and the suggestion you offer, and would be glad at any time to receive further information from you which you consider of print value.

Analysis of Bush Hay.

INQUIRER (Rockhampton)—

Your specimens were referred to the Agricultural Chemist, Mr. J. C. Brünnich, who advises as follows:—

	Bush Hay.				Good Mitchell Grass.			
	Per cent.				Per cent.			
Moisture	10.4	..	7.2	
Crude Protein	3.9	..	7.4	
Carbohydrates	44.7	..	43.3	
Crude Fat	1.3	..	0.9	
Crude Fibre	29.3	..	30.0	
Crude Ash	10.4	..	11.2	

This hay is of low nutritious value as compared with a good Mitchell grass, obtained from Longreach district. Sheep forced to live on it would perish on account of protein starvation, as only one-half of crude protein is digestible.

A 100-lb. sheep requires per day—2 lb. dry substance containing at least .12 lb. of digestible protein, and 2 lb. of above hay would only give .04 lb. of protein. About $\frac{3}{4}$ lb. of Kubettes or $\frac{1}{3}$ lb. of treacle cubes would supply the deficiency of protein. Nearly 2 lb. of maize would be required to give the same amount of additional protein. Of course, in practice, much smaller amounts would keep the sheep from starving.

Wowan Soils.

L.M. (Wowan)—

With reference to your inquiry *re* fertilising of soil prior to sowing it under cotton, the Assistant Agricultural Chemist, Mr. E. H. Gurney, advises as follows:—

Analyses of some soils from Wowan and district show that these soils upon the whole contain fair amounts of total and available lime, phosphoric acid, and potash. The humus content in some of them could, with benefit, be increased for growth of cotton crops, and it is recommended that leguminous crops, and when possible farmyard manure, be ploughed in, thus improving texture of soil and increasing soil nitrogen and humus content. A fair amount of phosphoric acid in the soil is necessary for the most successful cotton crop, but better results are obtained by application of artificial fertilisers if soil contains a fair amount of humus. Fertilisers for cotton crops will be found in pamphlet "Complete Fertilisers for Farm and Orchard," which is being forwarded under separate cover.

Wood Ashes as Fertiliser.

H.G.H. (Wondecla, N.Q.)—

The Agricultural Chemist, Mr. J. C. Brünnich, advises as follows regarding your inquiry concerning the use of wood ashes:—

“The ash of ironbark, bloodwood, &c., contains from 2 to 4 per cent. of phosphoric acid, 6 to 12 per cent. of potash, and 12 to 20 per cent. of lime, and is therefore a valuable fertiliser, applied at the rate of 5 to 10 cwt. per acre for grape vines.”

BOTANY.

Selections from the outward mail of the Government Botanist, Mr. C. T. White, F.L.S., which are of general interest.

Eucalyptus Baileyana.

INQUIRER (Brisbane)—

Your specimen proved to be *Eucalyptus Baileyana*, a species not previously known from the Toowoomba district.

Plants from South Burnett.

W.R. (Kawl Kawl, Proston Line)—Your specimens have been determined as follows:—

- No. 1. *Pteris falcata* var. *paradoxa*. A fern fairly common in the drier scrubs of South-Eastern Queensland. The fertile fronds are longer and narrower than the sterile.
- No. 2. *Acacia fimbriata*. Queensland Golden Wattle. One of the most ornamental of wattles.
- No. 3. *Hovea longifolia*. Family Leguminosæ. This and an allied species (*H. acutifolia*) are commonly called “Bush Sarsaparilla” as distinct from the trailing sort *Hardenbergia monophylla*.
- No. 4. A species of *Daviesia* or allied genus; flowers or pods required to determine.

Regarding your query re journals devoted to botany we may say there is a great number of these in existence, but practically all we know of are purely technical. In most of the States in Australia, however, there is a Naturalists' Club, and they issue journals devoted to general natural history, including botany. The Queensland Naturalists' Club, for example, issues the “Queensland Naturalist.” The best way to obtain this is to become a member of the Naturalists' Club (country membership 5s. per year, including the journal). This is issued quarterly as far as possible, but I doubt if it is exactly what you require. The name and address of the Honorary Secretary is, Miss E. E. Baird, Kennedy Terrace, Red Hill, Brisbane.

Canavalia obtusifolia.

W.K. (Boulder Creek)—

Your specimen was received through Mr. J. Peterson, M.L.A., for identification and report. It is *Canavalia obtusifolia*, a bean allied to the Sword Bean and Jack Bean, widely distributed in Queensland, though perhaps not very abundant in any one place. We have not heard a common name for it. Nothing very definite is known of its properties, but it is generally regarded as poisonous.

The Common Mallow—Its Stock Food Value.

P.H.G. (Trueman, Q.)—

The weed is *Malva parviflora*, the common Mallow, a native of Europe, now widely spread as a weed over the warmer temperate regions of the globe. This plant, along with others of the Mallow family, was, until quite recently, always looked upon as quite harmless, but investigations in New South Wales have shown it to be capable of causing staggers in stock. The weed has to be eaten in great quantities to cause this trouble, and I do not think it occurs here in sufficient quantity to be looked upon with fear, as in reasonable quantities it is a valuable forage, both green and dry.

Aquatic Plants in the Brisbane District.

INQUIRER (Brisbane).—Subjoined is a list of aquatic plants found in fresh water in the Brisbane area:—

Jussiaea repens. Clove Strip or Primrose-Willow (the name Evening Primrose more correctly belongs to plants of the genus *Oenothera*).

Hydrilla verticillata. Water Thyme.

Eichhornia speciosa. The Water Hyacinth.

Ceratophyllum demersum. Hornwort.

Lemna oligorrhiza. Duck Weed.

Azolla rubra. Red Azolla.

Najas tenuifolia. Water Nymph.

Ottelia ovalifolia. Swamp Lily.

Triglochin procera. Water Ribbons.

Utricularia flexuosa. Bladderwort.

Chara Benthani.

Nitella phauloteles.

Nitella diffusa.

To be added—

Myriophyllum variifolium. Water Milfoil.

Potamogeton crispus. Curled Pondweed.

Potamogeton tricarinatus. Floating Pondweed.

Potamogeton javanicus. Small-leaved Pondweed.

Vallisneria spiralis. Eel Grass.

Nymphaea gigantea. Blue Water Lily.

Limnanthemum indicum. Fringed Water Lily.

Probably should be added—

Phydrum lanuginosum.

Typha angustifolia. Bulrush.

***Phaseolus semirectus*.**

G.V. (Home Hill, N.Q.)—

Your specimen is *Phaseolus semirectus*, a fairly common plant in Queensland, but one for which I have not heard a common name. It is a native of tropical America, but is now widely distributed as a naturalised alien over the tropical regions of the world. It was originally introduced into Queensland as a fodder, and accounts of it abroad are rather good. Our experience here, however, on the whole, has been that cattle do not take to it when other food is available. It is a particularly valuable green manure, but the stems in older plants are rather woody for ploughing under.

Pepper Cress or "Mustard Weed."

C.McK. (Yeronga)—

Your specimen is *Lepidium rudercle*, the Pepper Cress. It is often very abundant during spring and early summer, and gives a bad "turnip" or weedy flavour to milk. In Queensland it is perhaps most commonly known as "Mustard Weed"—a name, however, applied to several plants of the same family, Cruciferae.

Woolly Burr Trefoil.

E.R.C. (Taroom)—

The small berries attached to the branchlet of lime bush represent germinating fruits of a species of mistletoe. The little trefoil is *Medicago minima*, the Woolly Burr Trefoil; this is more abundant in New South Wales than in Queensland, and is rarely seen here. The curled pods with hooked prickles aid in the plant's dissemination. The trefoils, on the whole, are not as palatable as some of the true clovers and other herbage, but they are nutritious, and many of them fairly drought-resistant.

SHEEP AND WOOL.

*Selected from the outgoing mail of the Assistant Instructor in Sheep and Wool,
Mr. J. Carew.*

Lung Worms in Sheep.

J. C. (Milmerran)—

The specimens of lung worms forwarded by you are the first to come under our notice in Queensland-grown sheep, a fact which we very much regret, as they are a very serious parasite in other countries. These parasites have been in evidence in New South Wales for a number of years and have been particularly troublesome in low-lying situations where the sheep drink from waterholes. We would appreciate any information regarding the possibility of how they were introduced into your flock. The lick 10 lb. salt and 1 lb. sulphur is very useful as a prevention against the development of the worm, and would be improved by the addition of 1 lb. sulphate of iron. The wet conditions during last summer were suitable for their development and spread.

Treatment.

The quickest and most reliable treatment as recommended by Major A. H. Cory, Chief Inspector of Stock, is to inject a solution directly into the trachea (windpipe). Oil of turpentine $\frac{1}{2}$ drachm, carbolic acid $\frac{1}{4}$ drachm, chloroform $\frac{1}{4}$ drachm, glycerine $\frac{1}{2}$ drachm. Half of these quantities for young weaners and lambs. To be thoroughly mixed together before using each dose, then slowly injected by means of a syringe into the windpipe. The needle of the syringe is inserted between the rings of the trachea about half-way down the neck. Making a small incision in the skin with a clean knife before the needle is inserted is recommended by some, but if the needle is fairly thick and carefully handled when being pushed through the skin, it will be found unnecessary to incise the skin. This injection causes considerable distress to the animal by setting up paroxysms of coughing, but it passes off without setting up any irritation, and is effective in destroying the worms. In bad cases it is advisable to repeat the injection on two or three occasions, allowing at least three days' interval between the injections, but in many cases one injection will be sufficient.

If it is impossible to procure a syringe or otherwise undesirable, a drench composed as follows can be given, but its action is not so effective:—

Oil of turpentine	..	..	..	$\frac{1}{2}$ oz.
Creosote	..	..	..	$\frac{1}{2}$ drachm.
Tincture of camphor	..	..	..	$\frac{1}{2}$ oz.
Milk or linseed	..	..	..	4 to 6 oz.

This drench should be given once or twice weekly for three or four weeks. When drenching lambs give half the quantity.

Salted Sheep Food.

I.A.McD. (Longreach)—Mr. W. G. Brown, Instructor in Sheep and Wool, advises as follows:—

“The reason that cracked maize or any other concentrated foods should not be offered sheep when mixed with salt is—hungry sheep seeking food will certainly eat an excessive amount of salt in the endeavour to obtain the food, and salt in excess is poisonous. When I said in the wire that whole maize broadcast is the best way of feeding maize, I had it in mind that cracked maize is a most wasteful way of feeding sheep. Even if put in troughs, the stronger sheep will shoulder away the weaker. The lick should not be offered to sheep with maize meals, nor any other concentrated feed. In the case of the sheep that drink saline water and have saline plants and scrub for roughage, and consequently will not take salt, I believe that they will take salt if bonemeal or Nauru phosphate be added. If they do, then I would advise that 5 per cent. of crude Epsom salts be mixed with the lick as well. I would recommend 40 lb. salt, 40 lb. Nauru phosphates, 20 lb. bonemeal, and positively no feed of any kind in the lick. A comparatively small amount of this lick could be offered as a trial before any serious expense is incurred.”

PIG RAISING.

The following replies are selected from the outgoing mail of the Instructor in Pig Raising, Mr. E. J. Shelton:—

Feeding of Pigs.

INQUIRER (Brisbane)—

The use of bonemeal, protein meal, meatmeal, and other mineral matters is certainly advised, for the reason that, in practically every district in this State and the other States, the soil and natural pastures and crops growing thereon are deficient in lime phosphates and other bone-forming materials and, as pigs in particular grow very rapidly and are forced on to maturity at a very early age, they rapidly outgrow their strength and put a strain on the bone-forming elements in their food which, in many instances, cannot be made up except by the addition of some concentrated readily soluble mineral matters.

Unfortunately, we have no local data to work on in regard to experiments in feeding pigs and in the use of meatmeals and other concentrates. A series of experiments was initiated on the Atherton Tableland recently in which maize, meatmeal, lucerne, and other foods were used, but the result obtained, while of value, cannot be used in publicity propaganda, unless the series is extended and carried out in other districts and on a larger scale. We strongly recommend the use of bonemeal, charcoal, wood ashes, lime water, as all these add valuable bone-forming material in readily soluble form, especially if the meals are finely ground and the lime water added to the food. We stand prepared to answer any questions in this regard not covered by the information supplied in printed form.

The pamphlet "How to Feed and What to Feed," published by Thos. Borthwicks and Sons, gives details on the use of their special lines, while Denham's, Ltd., Roma Street, whose advertisement will be found in this Journal, will, no doubt, also be glad to supply further details.

It is suggested, therefore, that a typewritten list of questions be submitted dealing with these matters, when they will have prompt attention and detailed answers will be supplied.

Pig Raising in Australia.

H.G., Aberdeen, N.S.W.—

- (1) Unfortunately, the average Australian farmer keeps no books or data from which could be gathered the actual cost of production of pigs, &c., hence it is difficult, if not well-nigh impossible, to determine the actual margin of profit over cost of actual production. It is generally conceded that pigs are a very profitable line of stock on our farms, and as this seems to be the experience of thousands of farmers it is accepted as a fact and used as one of the reasons why more pigs should be kept. There is little, if any, reliable data available in regard to cost of production of pigs, though odd experiments have been carried out which demonstrated that there is a sufficient margin of profit after allowing for the purchase of most of the food from sources outside the farm.

The writer has, for many years, endeavoured to have a continuous series of experiments initiated to demonstrate these and other factors in the industry but, so far, without success. Of American text-books we think the most up-to-date is the book entitled, "Feeds and Feeding," by Henry and Morrison. This book can be purchased through booksellers in any part of the State.

The system of pig raising we advocate in Queensland is one in which foods such as milk and farm grain and green crops are utilised. We use the expression that "Pig raising is essentially a farm foods and crop-growing proposition." It is our experience that only in this way can pigs be made to pay, for the cost of concentrated meals such as pollard is usually so high that unless they are fed in conjunction with cheaper-grown farm foods, the pork cannot be produced at a profit. We feel quite satisfied in saying that pigs can be bred and fed at a profit sufficient to cover labour and outlay on concentrates plus 75 per cent. or more of farm-grown foods.

If the pigs are to be fed on purchased concentrates alone, it is distinctly a commercial business proposition and must be treated as such in order to

ensure success. This system of farming would require a much wider knowledge of foods and feeding and of general management than is possessed by most working farmers. As the business is, therefore, comparatively a risky one, we do not advocate feeding entirely on purchased foods. We shall, however, be pleased to supply further information on this point if so desired.

- (2) A set of pamphlets, extracts from the "Queensland Agricultural Journal," have been forwarded. We have also posted a copy of Brünnich's "Stock Foods," and a small brochure entitled "How to Feed and What to Feed." The latter deals with proprietary made mixtures, which are well worth trial.

In the text-book "Potts on Pigs," also procurable through booksellers, will be found many references to the subject of feeding, and to experiments that were conducted at the Hawkesbury Agricultural College some years ago, with regard to the proportion of meal to use in conjunction with milk. In the pamphlet "Pigs for Profit" will be found a detailed list of foods available, with many references to their use.

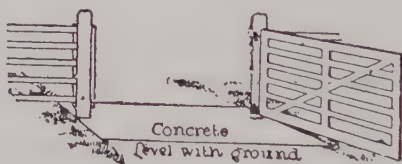
It would not be necessary, under ordinary conditions, to use more than 25 per cent. of concentrated foods, i.e., meals, the other 75 per cent. would be made up with milk, root crops, grain grown on the farm, pumpkins, &c., and green foods such as lucerne. Root crops such as Jerusalem artichokes, sweet potatoes, and small unsaleable English potatoes can be utilised to very considerable advantage, particularly in feeding young pigs.

Crops such as sorghum, cow cane, saccaline, soft varieties of sugar-cane, and grain sorghums are ideal bulky foods for breeding stock, as also are pumpkins, melons, &c., whilst good grass paddocks provide grazing which keeps breeding stock occupied, giving them a good "filler," satisfying them, and incidentally providing them with a good variety and cheapening cost of production of their progeny.

It is quite erroneous to suggest that milk is the only satisfactory food for pigs, as many thousands of pigs are produced annually in Australia and in other parts of the world that have no milk at all after weaning. The various other foods referred to, plus others mentioned in the pamphlet "Pigs for Profit," provide quite an extensive list of foods all well worth trial.

CONCRETE GATE ENTRANCE.

The space underneath the gate at the entrance to the barnyard is very apt to be a mudhole in bad weather. The sketch shows how I converted the mudhole under my gate into a dry, concrete walk. I dug out the space between the gate posts



about 2 or 3 feet on either side of the gate. This excavation was 4 inches deep. I filled this with concrete to a height of about 3 inches above the ground at the edges of the excavation. This eliminated the mudhole permanently. Four or five bags of cement will do the work.

"EVERY FARMER SHOULD SUBSCRIBE!"

A Mutdapilly correspondent: "Must congratulate you on such a valuable Journal. I think every farmer should subscribe to it."

THE METHYLENE BLUE TEST AND CURD TEST.

When a cheesemaker is troubled with fermentation (gas), bad flavours, or low-grade product, he can locate the source of his trouble by applying the methylene blue and curd test to each patron's milk supply, and obtain information that will materially assist him in carrying out his work. The methylene blue test was dealt with in the April issue of this Journal.

In carrying out the curd test the samples of milk submitted to the methylene blue test is held at a temperature of 98 to 100 deg. Fahr. until it coagulates. When the coagulation is firm it is cut into small pieces with a sterilised blade. Draw off the whey at intervals and allow the curd to mat. Hold the matted curd at a temperature of 98 to 100 deg. Fahr. for about twelve hours. In ten to twelve hours the curd should be finally examined.

The quality of the curd in conjunction with the methylene blue test determinations will enable the milk grader to classify the milk supply from each dairy farm, and will be indicative of the care given to the production and handling of the milk on the farm.

Regular periodic applications of these tests to milk supplies will generally determine the conditions pertaining to the production and handling of each milk supply. All low-grade milk can be detected, and the industry will benefit by the carrying out of the tests by milk-grading officers.

Cheesemakers are familiar with the characteristics of the curd produced from first-quality milk.

Inferior low-grade milk would be indicated by one or more of the characteristics, as stated hereunder:—

Character of Curd.	Class Bacteria present.	Indicative of Methods of Production.
Even, smooth, no gas holes, pleasant acid odour	Lactic acid producers	Sanitary
Slight gas holes	Lactic acid producers and gas-producing organisms	Doubtful
Gas holes prevalent	Gas-producing organisms predominate	Careless
Portion curd liquifies, odour disagreeable	Peptonising organisms	Unclean and insanitary generally

Some of the common sources of milk infection by undesirable micro-organisms, including gas forming, are—

- (a) Unclean milking;
- (b) Moistening the milkers' hands by drawing milk from the teat on to the hands;
- (c) Dirt with adhering micro-organisms from the cow's body falling into the milk;
- (d) Allowing the dairy cows to have access to impure drinking water, or allowing them to wade in stagnant water and bogs;
- (e) Feeding mouldy or decaying fodder to dairy cows;
- (f) Using the milk of unhealthy cows (inflamed udders, &c.);
- (g) Neglecting to cool the milk as soon as it is drawn from the cow;
- (h) Cooling in and exposing the milk to impure air, especially air charged with manure in the form of dust, carrying countless bacteria; also dust from hay and fodder;
- (i) Neglecting to strain the milk in an approved manner by passing it through a sterilised cotton wad;
- (j) The use of unclean unsterilised dairy utensils and machinery; and
- (k) Drawing whey and milk in the same cans without thoroughly washing and sterilising before the milk is placed in them.

ADVICE TO CREAM PRODUCERS.

The following is brought to your notice with the desire to point out clearly the defects that arise in cream, and to offer suggestions for remedying such defects so that the quality of the product may attain a high standard to the mutual benefit of the producer and the factory management. If the quality of the cream does not reach an A1 standard after you have given the abovementioned matters your attention, ask the assistance of the local Dairy Inspector—he will advise and help you:—

Defects.	Prevention.
I.—Cow ..	Keep milking-sheds clean. Remove manure from shed daily. Remove milk to separating-room immediately after milking. Store cream in clean surroundings.
II.—Food Flavours, Weedy	Do not feed high-flavoured foods immediately before or at time of milking. Milking cows should not have access to paddocks where carrot-weed, wire-weed, stinking-roger, and such like are growing. Musty inferior hay and silage should not be fed to dairy stock.
III.—Overripe, Stale, Rancid	(a) Cool cream as low as possible immediately after separating. Do not mix warm and cool cream together. Stir cream occasionally, using a tinned steel stirrer (do not use a wooden stirrer). (b) Deliver regularly to factory. Scald all utensils. Separate a cream with a butter-fat content of not less than 38 per cent. from October to March, and not less than 34 per cent. from April to September.
IV.—Curdy ..	Read No. 3 (a) prevention carefully.
V.—Fermented, Yeasty	Wash and dry cows' udders and teats before milking. Strain milk immediately after milking. Do not use rusty utensils. Do not allow cows to drink or wade in stagnant water or bogs. Remove skim milk from dairy on completion of work. Protect milk and cream from dust and flies. Read No. 3 prevention carefully.
VI.—Unclean ..	Do not use milk of newly-calved cows until seven days after calving, or from cows suffering from inflamed udders, or from other unhealthy cows. Watch carefully for mammitis, and report any suspicious case to Chief Inspector of Stock, who will advise in regard to treatment.
VII.—Ropey ..	Keep stock away from stagnant or bad water. Thoroughly clean and scald all dairy utensils. Do not use milk from unhealthy cows.
VIII.—Tallowy ..	Do not expose milk or cream to high temperatures or direct rays of the sun. Keep cream as cool as possible.
IX.—Absorbed Flavours and Odours	Do not allow milk or cream to come in contact with the odour of paint, disinfectants, engine oil, vegetables, fruit, &c. Smoking should be prohibited in the vicinity of the milking-shed and dairy house.
X.—Mould ..	Do not keep cream in an old wooden building without thoroughly limewashing walls and ceiling. Do not store bags, clothing, or articles other than dairy utensils in the dairy or cream room.

"NO FARMER SHOULD BE WITHOUT THE JOURNAL."

Thus a Warwick farmer (23rd August, 1927): "I am enclosing order form for the Journal, which I consider no farmer should be without. . . ."

General Notes.

Identification of Stock.

A Regulation has been approved under the Diseases in Stock Act giving an Inspector authority, if desired in special cases, to brand with a paint brand cattle that have been dipped.

Arrowroot Board.

A Regulation has been approved under the Primary Producers' Organisation and Marketing Act, requiring millers of arrowroot to forward to the Arrowroot Board weekly returns setting out the amount of arrowroot bulbs received and stock of bulbs and flour on hand.

Banana Levy Regulations.

These Regulations, approved under the Fruit Marketing Organisation Acts, provide for a levy at the rate of 4d. per every £2 worth of bananas sold in Queensland from 9th September, 1927, to 31st December, 1929. Before such levy can be made, however, a resolution must be passed by the Committee of Direction to that effect and notice of intention to collect the levy advertised. The levy will be collected by agents selling bananas and will be paid by means of levy stamps. Provision is made for growers who sell bananas privately to pay the levy direct to the Committee of Direction. The levy will be used solely in the interests of the banana industry. A penalty of £20 is provided for a breach of the Regulation.

Staff Changes and Appointments.

The appointment of Mr. S. M. Seumer as Inspector of Stock has been confirmed as from the 3rd February, 1927.

Constable J. M. Lyons, Windorah, has been appointed Inspector of Brands.

The following transfers of Slaughtering Inspectors have been approved:—T. E. Tuck, from Brisbane to Coolangatta; A. E. Mitchell, from Rockhampton to Brisbane; G. A. Smith, from Charters Towers to Rockhampton; and Mr. H. F. Sibley, of Goomeri, has been appointed Inspector of Slaughter-houses, on probation.

Mr. P. J. Short has been appointed Temporary Inspector of Stock and Slaughter-houses at Coolangatta.

Mr. J. A. McNicol, of "Wattle Camp," *viâ* Nauango, has been appointed Honorary Inspector under and for the purposes of the Animals and Birds Acts.

Mr. L. L. Gudge, Cotton Classer, has been appointed Cotton Classer and Salesman, Department of Agriculture and Stock.

Levies under the Marketing Act.

Regulations under the Primary Producers' Organisation and Marketing Act have been approved for the following purposes:—

(a) Empowering the Mossman Mill Suppliers' Committee to impose a levy on canegrowers in the Mossman district at the rate of 4d. per ton of cane delivered to the Mossman Mill during the 1927 season. The proceeds of this levy, if made, shall be utilised for administrative purposes in connection with the conduct of an office and payment of a secretary and paymaster for the harvesting of the cane of suppliers to the mill. Provision is made for the taking of a poll on the question of the levy, if same is demanded by at least seventy suppliers to the mill. Such request for a poll must be received by the Minister not later than 27th September, 1927.

(b) Empowering the Cotton Board to make a levy of one-eighth of a penny per pound on all cotton produced between the 1st January, 1927, and 31st December, 1931. This levy is to be paid into a capital fund to be expended in effecting any object which, in the opinion of the Cotton Board, is in the interests of cotton-growers. Provision is made for a poll to be demanded before 3rd October, 1927.

(c) Amending Regulation 175, published in the "Government Gazette" of the 30th July, 1927, providing for the making of levies by Hambledon, Pleystowe, and Tully Sugar Mill Suppliers' Committees. The Regulations originally provided for the levies to be deducted from the final cane payments due to growers by the respective mills, but the word "final" has now been omitted as the Canegrowers' Council desires the levies to be collected monthly.

Sanctuaries under Animals and Birds Acts.

The following have been approved as Sanctuaries for animals and birds:—
Property of W. J. Martyr, Taroom; Canning Downs, property of J. H. S. Barnes;
Timber Reserve No. 97, on the eastern fall of Eungella Range, Mackay; properties
of J. A. McNicol, C. S. McClymont, G. Stegeman, and Mrs. E. E. Toop, of the
Nanango district.

Peanut Board Election.

Following is the result of the annual election of Growers' Representatives to the
Peanut Board:—

District No. 1 (Wienholt and Nanango)—				
Charles Frederick Aderman (Wooroolin)	..	..	121	votes
Malcolm Redman (Crawford)	..	..	87	"
John Coe (Memerambi)	..	..	85	"
John Wesley Johnston (Wooroolin)	..	..	63	"

District No. 2 (Central District)—

Alfred Skinner Clark (Sandhills) returned unopposed.

District No. 3 (Rest of Queensland)—

Richard Major Wise (Buderim) returned unopposed.

Messrs. Aderman, Redman, Clark, and Wise are accordingly elected. Three of
these gentlemen were members of the old Board, and Mr. Redman takes the place of
Mr. Muir, who is now the manager of the Peanut Pool.

Wheat Board Election.

Following is the result of the annual election of Growers' Representatives to
the State Wheat Board:—

District No. 1 (Dalby, Maranoa, Nanango, &c.)—

Robert Swan (Wallumbilla) returned unopposed.

District No. 2 (Electorate of Pittsworth)—

Arthur Carl Krieg (Brookstead) returned unopposed.

District No. 3 (Warwick, Killarney, &c.)—

Bergittinus C. Kirkegaard (Freestone)* 330 votes

Alexander N. Allen (Campbell's Plains) 75 ..

District No. 4 (Cunningham, &c.)—

Thomas Muir (Allora) returned unopposed.

District No. 5 (Toowoomba, Lockyer, &c.)—

John Archibald (Oakey) 152 ..

Patrick McNee (Kingsthorpe) 121 ..

One representative is required for each district. Messrs. Swan, Krieg,
Kirkegaard, Muir, and Archibald, who were retiring members of the Board, are
accordingly re-elected.

Atherton Tableland Maize Board Election.

The election of Growers' Representatives to the Atherton Tableland Maize Board
took place recently at Atherton, and was presided over by Mr. A. H. Jones, of the
Department of Agriculture and Stock, Brisbane, as Returning Officer. Following are
the results:—

Lyall Reginald Crouch (Atherton)	..	..	..	208	votes
Harold Henry Collins (Atherton)	..	..	..	187	"
George Douglas Howe (Tolga)	..	..	..	185	"
George Charles Finch (Atherton)	..	..	..	178	"
Vincent Patrick Higgins (Kairi)	..	..	..	173	"
Harold Walker Hallett (Pearamon)	..	..	..	169	"
James Joseph McDonald (Tolga)	..	..	..	161	"
James Paul McCarthy (Tolga)	..	..	..	157	"
John Gargan (Atherton)	..	..	..	148	"
Neil Neilson (Kairi)	..	..	..	126	"
Mark Sims (Atherton)	..	..	..	55	"

Five members were required, and Messrs. Crouch, Collins, Howe, Finch, and
Higgins were accordingly elected. Of these, Messrs. Collins and Crouch were retiring
members.

These members will hold office from 1st September, 1927, to 31st March, 1929.

Furniture from Queensland Timbers.

Queensland farmers are familiar with many of the fine timbers grown in their State, and of special interest to them is the manufacture of beautiful furniture from these timbers. Messrs. John Hicks and Company, Limited, have been associated with furniture and furnishings for over half a century, and to-day, the "Hixco" factory is the largest furniture factory attached to a retail furniture warehouse in Queensland. In fact, it is considered that few others are larger than it in any part of Australia. The "Hixco" idea is to serve, not to sell, and these rooms show how it is possible to furnish a home tastefully and inexpensively without cramming it full of furniture. Some conception of the amount of work provided for Queenslanders, both in the city and country, by the manufacture in Queensland of furniture from Queensland-grown timbers, may be obtained from a visit to the "Hixco" warehouse in Brisbane.

How the Public Curator Serves the People.

In standing by the principle of Queensland Preference on the grounds that "The love of country prevails," you are asked to advocate the use of Queensland goods and articles, to favour the employment of Queenslanders, and to uphold the interests generally of this great State.

To take this great principle of preference a step further, you are asked to use your own State institutions, of which the office of the Public Curator of Queensland is one.

In appointing the Public Curator your Executor and Trustee, you have behind you the guarantee of the State, which, in effect, means the assurance that your estate, when you have passed away, will be safely and honestly administered in the very best interests of your beneficiaries.

Furthermore, in appointing the Public Curator your Executor or Administrator you have the added assurance of a permanent trustee; that is, one who, by virtue of his office, never dies, and one who, moreover, never goes insolvent and never absconds with the moneys that rightfully belong to your dependents. Then, again, to the shares of all infants held until they attain their majority, the Public Curator adds 5 per cent. per annum interest. What other Trustee in Australia, let alone Queensland, acts so liberally? Not one. Private Trustees usually place the shares of infants in the Savings Bank, where interest at the rate of $3\frac{1}{2}$ per cent. only is added. Is not 5 per cent. better than $3\frac{1}{2}$ per cent.?

A Safe Investment for Your Moneys.—The Public Curator is also prepared to receive from you for investment on fixed deposit sums of £100, or more, for twelve months or longer, on which interest at the rate of five (5) per cent. per annum will be paid to you every three months, without any costs or deductions. All investments of this nature are guaranteed by the State, so that there is no risk of any loss.

Steady Growth.—The steady growth of the Public Curator Office is being well maintained. At the end of the financial year, 30th June, 1927, the "Profit and Loss Account" showed a profit of £6,094. The total profits—carried to a reserve fund—since the inauguration of the office in 1916, now reach the respectable sum of £49,000, notwithstanding the fact that the charges of the office for work performed have been reduced from time to time, so that they are now the lowest in the Commonwealth for carrying out the duties of Administrator, Executor, or Trustee.

Wills Made Free of Any Charge.—You are invited to consult the Public Curator in regard to making your will, because it is dangerous to have a will drawn up by an inexperienced person, as legal complications are likely to arise which, invariably, can only be settled by the Supreme Court at great expense to the estate.

Income Tax Returns.—Who is not considerably worried every year in the making out of Income Tax Returns? The Public Curator has an expert staff who is prepared, for a small charge, to prepare your returns for you. You have only to read the daily papers to learn how many people are prosecuted every year for either failing to send in to the Commissioner Income Tax Returns or for sending in incorrect returns.

Home Builders and Home Seekers.—The Public Curator is also prepared to assist people to build or buy homes up to 60 per cent. of the value of the land and improvements. For example: If you desire to purchase a home for £1,000 the Public Curator will advance £600 towards the purchase, and take a first mortgage at 7 per cent. per annum as security for the £600.

The Public Curator has now Branch Offices at Rockhampton, Townsville, and Cairns.

Oil Prospects.

The geological adviser to the Commonwealth Government (Dr. Woolnough), who recently returned from an examination of the various areas in the interior of Australia in search of oil-bearing country, says that there is every reasonable chance of oil being found, provided the search is carried out on proper scientific lines.

The Commonwealth Government proposes to have an oil survey made of New Guinea and Papua, and the preliminary work will be carried out by aeroplanes. Dr. Woolnough left for Papua on 17th September.

The Minister for Home and Territories (Mr. Marr) is taking a keen interest in the search for oil, and he said recently that two of the Australian Air Force 'planes would leave almost immediately. The officers in charge of the 'planes would prepare a base map for the geologists. Reports from the Roma oil bore are distinctly encouraging. A strong gas flow has been tapped with a pressure up to 375 lb. From the gas petrol has been extracted, and generally oil prospects in Queensland are at present very promising.

The Value of Wheat-breeding.

Canada is now the third largest wheat-producing country in the world. This achievement is directly due to the experimental work in wheat-breeding carried out at the experiment stations. Up to the end of last century certain strains of wheat, such as Red Fife and Huron, were grown successfully in the Eastern Provinces. But the shorter growing period and the early frosts of the North and West prevented successful production in these vast regions.

A writer in the "Scottish Journal of Agriculture" relates that Dr. Saunders and his associates, by breeding and selection, produced a strain which ripens about a week earlier than the Red Fife, and which has a strong straw and a non-shattering head, which are obviously valuable characteristics for the great wind-swept plains. This strain, known as Marquis wheat, made wheatgrowing possible for the whole of the Western Provinces, and considerably extended the Northern limits of successful wheat production. To-day it is estimated that 95 per cent. of Canada's wheat areas is in these prairie provinces. It is very interesting to note that 90 per cent. of the total wheat yield of the Western Provinces is developed from the single seed of Marquis wheat discovered in 1903. It is estimated that Marquis wheat has increased the earning power of Canadian farmers by at least 20,000,000 dollars per annum.

The wheatgrowers of Australia owe, relatively, quite as much to the plant breeder. Indeed it is possible that the debt is even greater here, for breeding and selection have produced a number of varieties suited to a great variety of conditions, and have thus added incalculably to the security of wheatgrowing in the Commonwealth.

Distinguished Visitor's Pleasant Memories of Queensland.

The Diwan Rangachariar, who represented the Government of India at the opening of the Federal Parliament House at Canberra, writing to the Editor of this Journal, from "Ritherdon House," Vepery, Madras, India, says:—Myself and my two sons returned home on the 17th July. We had a very rough voyage for the first two days after we left Fremantle. The Orient Line steamer "Orvieto" responded beautifully to the pitch and toss she was subjected to. We landed in Colombo on the 14th July. It was a very good and pleasant company we had on board. My family members are all doing very well and our home coming was duly celebrated by the boys and girls. I had a grand reception at Colombo and again here in Madras. I gave an address at Colombo under auspices of the Y.M.C.A. to a very large audience. The subject was "Democracy in the East." I gave two or three interviews. I am already booked here for several speeches—"Life in Australia," "Life, Urban and Rural, in Australia," "The activities of the young in Australia," "The Citizen in Australia" are so far booked under the auspices of several associations.

We had a very pleasant time of it there. Thanks to your splendid hospitality, I learnt many things about your country and your people. I am looking forward to renewing my acquaintance with you all and your country at no distant date.

I thank you one and all for all that you did to make our stay agreeable and instructive. I trust India will find a warm corner in your hearts and a close union between the two great countries will soon be effected.

I am looking forward to your visit to our country and you may count on my humble assistance to make your tour here enjoyable.—Yours sincerely,
D. RANGACHARIAR.

Royal Society of Queensland.

The Ordinary Monthly Meeting of the Society was held in the Geology Lecture Theatre on Monday, 29th August, 1927.

The President, Professor E. J. Goddard, was in the chair.

The President called for nominations for three trustees of the Society, and on the motion of Professor H. C. Richards, seconded by Dr. E. O. Marks, it was decided to ask Mr. F. Bennett, Mr. J. B. Henderson, and Dr. A. Jefferis Turner to accept the positions.

Messrs. A. M. Epps and L. Franzen were nominated for ordinary membership of the Society.

Dr. F. W. Whitehouse exhibited (a) goniatites, probably belonging to the genus *Eumorphoceras*, from the Rockhampton Series at the 2-mile tunnel on the Many Peaks-Monto Railway. These appear to represent an horizon about the very base of the Upper Carboniferous; and (b) rolled Devonian pebbles containing *Spongo-phyllum halysitoides* from the lower limestone in the carboniferous beds near Mount Lion (Central Queensland).

Dr. W. H. Bryan exhibited specimens of a non-calcareous oolite from the north bank of the Pine River, about three miles from its mouth.

Professor E. J. Goddard exhibited a live specimen of a new species of *Peripatus* collected on Dunk Island, North Queensland, by Mr. W. Cottrell Dormer during the University biological excursion in the latter part of August.

A lecture entitled "Giants of the Past," illustrated with specimens and lantern slides, was given by Mr. Heber A. Longman, F.L.S., C.M.Z.S. The principal vertebrate fossils found in Queensland deposits were concisely dealt with, prominence being given to the large marsupial cranium from Brigalow, Darling Downs, described as *Euryzygoma dunense*, and to the giant Dinosaur *Rhoetosaurus brownei*. An outline was given of the classification of the many families of Dinosaurs, and the lecturer stated that recent intensive studies of comparative anatomy had greatly enlarged our knowledge of extinct as well as living vertebrates.

Manurial Trials with Broom Millet.

A number of broom billet experiments were arranged around Coraki on the Richmond River (N.S.W.) last season, but seasonal conditions were so adverse that the plots were either failures or valueless for comparative purposes.

At Tatham, via Casino, Mr. J. P. McDonnell was somewhat more fortunate as regards situation and weather at harvesting time. The soil is a heavy black alluvial which had been previously cropped with maize and ploughed in August and September. Thorough cultivation was then given in preparation of the seed-bed for planting. However, the weather remaining dry, planting was not carried out until 24th December. An excellent germination was obtained, and the cultivators were kept moving during the early stages of growth.

The rainfall during the growing period was as follows:—January, 1,320 points; February, 441; March, 408; April, 285; total, 2,454 points.

The results obtained were as follows:—

	cwt.	qr.	lb.
Superphosphate, 2 cwt. per acre at planting, and top-dressed with $\frac{3}{4}$ cwt. nitrate of soda just before the head appeared	9	0	4
Superphosphate, 2 cwt. per acre at planting	7	3	1
No manure	6	3	25

The plots manured with superphosphate at planting were more vigorous and of a healthier and darker green than the unmanured plot. The top-dressing with nitrate of soda just before heading had the effect of forcing the heads out quickly; they were half out on this plot before the heads on the other plots commenced to appear.

The results are of great significance to the mill-growing of the State, for only a few at present use fertilisers. The top-dressing at heading stage with a gentle-acting nitrogenous fertiliser, such as nitrate of soda or sulphate of ammonia, not only markedly increases the yield, but is likely also to much improve the quality in two ways: (1) by forcing the heads out quickly and thus reducing the amount of bent brush, and (2) the rapid exsertion of the brush from the leaf sheath deprives aphids of shelter, and thus ensures greater freedom from the discoloration caused by those insects.—M. J. E. SQUIRE, Agricultural Instructor, in "Agricultural Gazette," N.S.W.

Gidyea for Sheep.

Gidyea, by some, is regarded as harmful only when in green pod; the pods possess a saponin, which so far has not been found in the leaves (phylloides). Some of the saponins are known to be poisonous, but the whole question is one that is worthy of the fullest investigation both by means of feeding experiments and chemical analysis.

Personally, I think that Gidyea can be used safely when in leaf only, but this is only a belief and is not backed by any scientific evidence.

We have no chemical analysis of Gidyea to show how it compares with Mulga in nutritive value.—C. T. WHITE, Government Botanist.

Increasing Milk Production.

According to the Department of Agriculture, U.S.A., the "Milk-for-Health" campaign has increased the consumption of milk in the United States approximately 27 per cent. in the eight years for which results have been checked.

As the result of more than sixty separate drives in which the Department assisted in 1918-1925, an average reduction of 12 per cent. in under-nourishment among school children has been accomplished.

The report states that many cities and rural communities have found that there is a relatively high percentage of under-nourishment among children, and that this condition frequently accompanies a low average per capita consumption of milk. Experience has shown that this failure to use an abundant supply of milk cannot be attributed wholly to a lack of material wealth, but rather to a lack of information regarding the importance of milk in the normal development of the growing child.

In 1918 the United States Department of Agriculture formulated a plan for carrying on milk-for-health campaigns. A definite arrangement was made for co-operation with the extension service of the State agricultural colleges, and early in 1919 the first milk-for-health campaign was conducted in one of the New England States. This was followed by similar work in near-by States. Gradually the idea spread, and campaigns of this kind have been conducted in over thirty States.

The result of these combined efforts is a 27 per cent. increase in consumption of milk in the States since 1918, and an average of 12 per cent. reduction in under-nourishment among school children has been effected in those communities in which comparisons could be made, while the increase in milk consumption has ranged from 10 to 30 per cent.

Fertiliser Trial with Tomatoes.

A fertiliser trial with tomatoes was conducted by Mr. R. D. Westmore at Farm No. 971, Griffith (N.S.W.) during 1926-1927 season. Plots of one-fourteenth acre each were planted on 11th December, 1926, each plot containing an equal area of Red Stone and San Jose varieties. They were planted in well-prepared land which had previously grown a crop of peas that had been ploughed in in July, 1926. The harvesting of the tomatoes commenced on 7th March and continued until 6th May.

The fertilisers used and the yield obtained were as follows:—

	Yield per Acre.			
	t.	cwt.	qr.	lb.
No manure	3	8	1	0
Superphosphate, 2½ cwt. per acre	3	15	1	0
P7, 2½ cwt. per acre	4	4	1	0
P1, 2 cwt. 3 qr. 14 lb. per acre	4	0	2	0
P10, 3½ cwt. per acre	3	15	2	0
Basic superphosphate, 3 cwt. per acre	3	11	3	0
Superphosphate, 2½ cwt., with sulphate of ammonia, 1 cwt., top-dressed	3	16	0	14

The composition of the mixed fertilisers was as follows:—P7 equal parts of superphosphate and bone dust; P10, 10 parts superphosphate, 1½ parts of sulphate of ammonia, and 1½ parts of sulphate of potash; P1, 10 parts superphosphate and 1½ parts sulphate of ammonia.

The season was not a particularly good one for tomatoes, and the yields were only fair and scarcely payable. Apart from lack of rainfall, the atmosphere conditions did not favour production of thrifty and healthy vines.

The increases obtained from fertilisers were not great, but on local factory prices of £6 per ton, P7 gave an increased gross return of £4 16s., and P1, £3 15s. per acre. Deducting the costs of these two fertilisers, the net monetary improvement from the use of P7 was £4 0s. 3d., and from P1, £2 15s. per acre.

The increase obtained by top-dressing hardly justified that practice.—E. B. FURBY, Agricultural Instructor, in the "Agricultural Gazette," N.S.W.

The Home and the Garden.

JAM AND JELLY MAKING.

MARGARET A. WYLIE, Inspector and Organiser of Domestic Science, Education Department, Western Australia.*

At this season of the year, when fruit is abundant, a few directions on the making of jam and jelly should not be amiss.

Floating about in the air, unseen to the naked eye, are tiny organisms which have power to reproduce their kind. These are of numerous varieties: some consist of minute plant life, the spores of which seem to be just waiting for soil suitable to their growth, where they become visible in forms such as moulds and yeast; others known as bacteria are micro-organisms which form masses or colonies, and cannot be seen except with a microscope.

The processes of jam making and fruit preserving cannot be adequately dealt with unless the action of these be considered, as they are the chief causes of fermentation. Another class of ferment which should be mentioned are enzymes. These are the natural ferments found inside fruits, vegetables, and grains, and which in the course of development break down cell walls which enclose them, giving rise to gases which spoil the fibre of the fruit and cause decomposition.

Moulds, of grey or brownish colour, are seen on decaying fruit. As a rule they thrive in dark damp places where there is little or no circulation of air. They grow rapidly and change in colour as they get older. Their necessary foods are sugar and starch. The spores of these moulds drop from the plant on to exposed food, and immediately grow and send down roots into this food soil. This may be seen in the quick decomposition of stewed fruit, which is only partially preserved with but a small percentage of sugar, and cooking only sufficient to break down the fibre. Consequently a short time sees acid fermentation begin, gases being generated and given off and mould forming. Much the same thing happens in the case of jam and jelly when its manufacture has been carried out in a haphazard fashion.

The Fruit.

This should be suitable, and at that stage of ripeness when it contains most pectin. Pectin is fruit jelly, and is found in just under-ripe fruit in larger quantities than at any other time. This substance enables jam to "jell." Fruit, therefore, should be jelly ripe for jam and jelly if the best results are to be achieved. By "unripe" is meant that stage when fruit is coloured and firm, yet not ready for eating. In over-ripe fruit sugar preponderates. When fruit is ripening pectin is converted into sugar. Jams and jellies made with fruit that has been plucked a long time or is very over-ripe will candy or ferment and turn mouldy. Sometimes it is necessary to add a little citric acid to draw out the pectin and hasten the "jell" point.

In up-to-date factories a jellometer is used to determine the amount of pectin in the juice; also a saccharometer to determine the amount of sugar present. The usual mistake in jelly making is the addition of too much sugar, the result being a syrup instead of a "jell."

Almost any variety of fruit is suitable for jam making, though some are preferable to others. With few exceptions fruits are treated in the same way. Oranges and lemons, on account of their jellying properties, will stand a large addition of water. Mulberries, lacking in pectin, will not jell unless other fruit, strong in acids, such as apples and lemons, are added to them. A frequent cause of failure is the use of damaged fruit. It is often too sweet and has lost its true flavour.

Sugar.

The part that sugar plays in jam and jelly making is that of a preservative. Excessive sugar will not cause mould, but excess of sugar takes from the quality of the article in respect to flavour and appearance. Each variety of fruit has its distinctive flavour and colour, more or less delicate and delicious. Every care should be taken to preserve these. For household purposes $\frac{1}{2}$ lb. of sugar to 1 lb. of prepared fruit for jam is a good formula; for jelly one cup of sugar to one cup of strained liquid. Circumstances alter cases, however, and if the housekeeper wishes to excel, she should use her powers of observation and keep notes from time to time for future reference. The best granulated sugar should be used, and damp dark sugar strictly avoided.

* In the "Journal of Agriculture," W.A.

Method for Jams.

The methods of making the different types of jams vary very little. As a general rule the addition of a little water to the fruit adds to its clearness, and prevents burning before the juices commence to flow. It is possible, but not easy to make jams without a proper preserving pan. Iron pans should never be used, as they spoil the colour and flavour. Strong enamel iron pans are best, and with care will last a lifetime. These should be fairly shallow to assist speed in boiling. A large wooden spoon (or child's wooden spade for preference) should be used for stirring. Jam jars should be in readiness; glass jars have replaced the delf of olden times. Glass bottles are cheaper than jars, but for convenience sake should have wide necks. The receptacles should be clean and dry. Just before using they should be heated, not only to prevent the hot jam from cracking them, but also to dry off any moist air in the jar or bottle. Coverings of white paper and labels should also be in readiness. Avoid use of tin lids unless the proper and complete process of sterilisation is carried out. The preparation of fruit is of importance, and differs according to the variety. If freshly picked, the bloom should be rubbed off. Plums, nectarines, and peaches should be cut in two, and the stones removed. Crack quarter of the stones of nectarines and peaches, and cook the kernels with the fruit.

General recipe for making stone and berry fruit jam:—

Ingredients—

6 lb. of prepared fruit.

4½ lb. of sugar.

A little water (about a pint).

Method—

Boil fruit and water until the fruit is soft.

Gradually add sugar, stir frequently, and boil until "jell" point is reached.

Bottle while hot.

Cover when cold.

When stirring cannot be carried out regularly, it is advisable to have a sheet of asbestos under the pan to prevent the preserve burning, but it should be borne in mind that the quicker the process is carried out the better will be the appearance of the completed product, and the more bright and sparkling it will be. Over-boiling weakens it, and in the end destroys the jelling properties of the fruit, and the jam often becomes sticky and viscous. To test for the jell point put a small quantity (one teaspoonful) in a saucer and place in a draught of air. If it completely sets the jell point is reached, and the jam is then ready for bottling.

Jelly Making.

To be brief, the aim is to get jelly with both good colour and flavour, as well as a clear and sparkling appearance. When slipped out of the glass it should retain its form and cut clean with a knife. It is often thought that only apples, quinces, and citrus fruits are suitable for jelly making, but as a matter of fact English gooseberries, Cape gooseberries, grapes, passion fruit, and melons make excellent jellies. The same degree of ripeness of the fruit should be observed as in jam.

Cleanliness and care are indispensable. The fruit should be clean, and all utensils and cloths scrupulously so.

Directions—

- (1) Wash fruit, cut apples and quinces into four or six pieces without removing skins. Grape and berry fruits crush a little.
- (2) Put fruit in preserving pan with sufficient cold water to cover well.
- (3) Bring to boiling point and boil gently until fruit is soft, stirring occasionally.
- (4) Pour into a jelly bag and allow to drip. Do not disturb the pulp. It is advantageous to strain the liquid a second time, pouring it through the pulp.
- (5) Measure strained liquid.
- (6) Place again in pan, bring to boiling point and add sugar (one cup of sugar to one cup of liquid).
- (7) Boil quickly till it jells (about 20 minutes).
- (8) Remove any scum before potting.

Note.—A chair turned upside down on the table may be used as a frame for the straining process. Fasten a clean tea-towel by its corners to the ends of the legs, allowing it to sag a little. Place a basin underneath to catch the fruit juice.

STORY OF THE GARDEN.

PURPOSE OF THE FLOWER.

By E. FITCH DAGLISH, Ph.D.*

So used are we to seeing gardens gaily decked for a great part of every year with a multitude of smiling blossoms that it is almost impossible for us to visualise an entirely flowerless world. Yet there were not always flowers. For countless millions of years vegetation on this earth consisted only of monster ferns, growing to the size of trees, pines, huge club mosses, gigantic horse-tails. Only when the lower layers of what now form the chalk cliffs and hills were being formed beneath the sea—something like 12,000,000 years ago—did flowers, or rather flowering trees, begin to brighten the gloom of those great forests represented nowadays by our deposits of coal. From that ancient time, however, flowering plants have ever continued to advance in type and multiply in variety.

The earliest flowers depended on the wind for pollination. They were small, green, and unattractive, similar in many respects to the inconspicuous flowers of our present-day catkin-bearing trees. When pollen is carried by the wind, the chance against any given grain of this dust being blown on to the stigma of a flower of the same kind is very remote, and a great waste of pollen is inevitable. This necessitates the manufacture of enormous quantities of pollen in order to ensure that a sufficient number of seeds be set by the plant concerned to perpetuate the species.

At the time these wind-pollinated plants represented the "last word" in vegetation insects of various kinds, including short-tongued flies and beetles, had made their appearance on the earth and to these pollen naturally offered an easily obtainable source of food. But even more appreciated would be the drops of sweet-tasting fluid which were to be found on some of the plants. Originally this syrup was doubtless secreted as a waste product, indifferently on the leaves and in the neighbourhood of the flowers, but, where it occurred in the latter position, to get at it the insects would often have to come into contact with the pollen and thus become dusted with this material.

Pollen Carriers.

In this way these early nectar seekers became the pioneers in the traffic in pollen, which has exerted such an important influence on the development of both flower and insect types. Individual plants having a tendency to secrete the nectar-like fluid near the flowers would obviously obtain an advantage over those of their neighbours in which the waste product was given off on the leaves or other parts, and could stand a better chance of setting large numbers of seeds. Those of their offspring which inherited this peculiarity would in turn benefit, and in course of time this advantage, in face of the excessively severe competition or struggle for life found throughout the plant world, might well give rise to a breed in which the secretion of sweet liquid in the flowers was a well-marked characteristic.

The blossoms of the ivy furnish a good example of the kind of flower which would be formed in this way. Here the nectar is freely exposed in the small blooms, and may easily be reached by all sorts of short-tongued insects. But although this represents an obvious advance on such flowers as those of the hazel, which still depend solely on the wind for the setting of their seeds, it is by no mean devoid of defects. The fact that the nectar stores are easily reached is in itself a drawback for many tiny, crawling creatures may avail themselves of the sweets provided without conferring any sort of benefit on the plant which thus entertains them. Further, this type of blossom is very liable to damage by rain and is not conspicuous enough to attract large and busy insects.

Let us consider now how the form of the ivy flower could be improved so that all the drawbacks mentioned might be removed. First, it is necessary to devise some means of excluding all but those insects of such size and shape as may serve as pollen carriers. This is not so easy a matter as might at first be supposed, for most of the devices which will effectually keep out useless visitors from the nectar will operate also against those whose visits are particularly required. Next, the store of syrupy liquid must be protected from being damaged by rain, and, finally, the flowers need to be made more attractive and conspicuous in order that flying insects may be made aware of their position.

The buttercup will serve as an example of a plant which has produced flowers answering to all the requirements named while still retaining a comparatively simple structure. Here the nectaries are protected by a scale, and are so placed that the

* Reprinted from "Brisbane Sunday Mail."

nectar may be obtained only by insects possessing tongues at least $\frac{1}{2}$ in. in length. Thus all very tiny insects are prevented from stealing the sweet bait, while visitors whose bodily structure enables them to reach the desired food can hardly help rubbing their bodies against the plants' stamens and stigmas and thus bringing about fertilization of the flowers.

The Flower and its Make-up.

Before proceeding further to consider the meaning underlying the many different shapes presented by flowers, it may be well to pause to examine the various parts which go to make up a flower. Most conspicuous is the coloured part, or corolla, which is made up of a number of parts, either separate or partly or wholly fused together and called petals. Beneath this is a cup-like part called the calyx, consisting of several sepals. This latter portion entirely surrounds the base of the corolla, and is usually green in colour. Within the space enclosed by the petals lie the sexual organs, consisting of the stamens and the pistil.

The former constitute the male part, and are composed of a variable number of pale-coloured, often thread-like, filaments, on the top of each of which is a yellowish or brownish head, the anther, bearing the pollen, or fertilizing dust. In the centre of the ring of stamens rises the pistil, consisting of three very distinct parts. The uppermost portion is expanded into a fleshy stigma borne on a stalk-like style, which in turn rises from a swollen basal part, the ovary, in which the ovules, or seeds in embryo, lie concealed. The position of the ovary varies in different flowers. In such plants as the buttercup, poppy, and geranium it is enclosed by the petals, but in others, as in the fuchsia, it lies below the coloured portions.

When the ovules have been fertilized, and thereby transformed into seeds, the ovary becomes the fruit, and often undergoes a complicated series of changes. The apple furnishes a good example of this. Compare the ovary on an apple bloom in the spring with the ripe fruit plucked in autumn from the same tree and the changes will be seen.

The Struggle for Life.

That flowers exhibit an almost infinite variety of shapes is a fact with which every gardener must be well acquainted. It is only necessary to walk through a garden at any time during late spring or summer to have this impressed upon one in no uncertain manner. In rapid succession we note the open blooms of the poppy, the funnel-shaped flowers of the convolvulus, the long-spurred columbines, the pea-like lupins, and the rayed sunflower, together with a host of others too numerous to mention. This almost bewildering diversity of shape in flowers has been brought about not by accident or haphazardly, but in response to necessity imposed on the plants by the conditions governing the struggle for life. Each of the various shapes found represents a special modification, developed in order to adapt the flowers to the visits of certain insects—and all can be explained in this way, and in no other.

What a Flower Is.

So different are the brightly-hued flowers from foliage leaves that it may seem difficult to credit the statement that the flower is in reality only a leaf shoot which has been modified to carry out the special duties of reproduction. It was the poet Goethe who first recognised that petals, sepals, stamens, and the parts of the ovary all originated as leaves, and pointed out how all these structures, apparently so different in every respect, resemble foliage parts in their early stages in the bud.

If a leafy shoot be examined, it will be seen that each leaf, or pair of leaves, is separated from those above and below it by a length of wood. As the tip of the shoot is approached the leaves become nearer together, until at the extremity we find a number of small young ones, apparently all arising from the same point. In the flower the spaces between the leaves have been suppressed, and the outer ring of sepals represent the lower series, the petals the next, then the stamens and the parts of the pistil the terminal series.

However difficult it may be to see in the glorious floral products of our gardens but a mass of modified leaves, there is no doubt that this is what they really are, and evidence of the truth of this statement is offered in plenty by the flowers themselves. The white water lily is one of the most useful for the purpose of showing how leaves may have been transformed into floral parts in easy stages. If a bloom of this plant be pulled to pieces and the portions systematically arranged, it will be seen that the passage from the green leaf like sepals on the outer ring to the yellow stamens in the centre is a very gradual one, all kinds of intermediate stages being marked. In many instances it is impossible to decide whether a

particular part should be counted as a petal or as a stamen, or as a sepal or a petal, for some of the characters of each are shown.

Again, if a very large number of garden flowers are carefully examined, a few are almost sure to show a reversion in some of their parts to ordinary foliage leaves. In primulas some of the sepals may assume the form of the leaves characteristic of the stem, while the small, pea-like flowers of the clover will occasionally change into three-lobed leaves. Many flowers show a few stamens in which the ordinary thread-like filament is wholly or partly changed into a pistil; while it is by no means uncommon for certain varieties of garden roses to produce blooms in which the petals in the centre show the green colour and shape of leaves.

The double cherry may be cited as a further proof of the truth of the theory that traces the origin of the flower to a modification of normal leaves. When a bloom of this kind is pulled to pieces, after the petals have been removed it will be found that the centre is occupied by two folded green leaves, in the place where the ovary should be. Further, as the petals are plucked off, every gradation may be traced from those showing the ordinary shape and character of these parts, through what appear to be half-stamens to normal stamens, which in turn give place to green, leaf-like bodies, which might be either partially developed stamens or leaves.

All so-called "double" flowers are likely to show similar half-structures, for the vast majority of them have been raised artificially and have assumed their double character as a result of some of their stamens having been transformed into additional petals. Thus the centres of many old roses will be found to contain malformed petals, bearing partly developed anthers at their ends, or stamens with filaments expanded into irregular-shaped petals. From the foregoing it may be agreed then that, without going outside the garden, it can be shown that leaves may change into sepals, sepals into petals, and these into stamens; but what of the ovary. How shall we understand how this apparently highly-organised part has arisen from a leaf? The common culinary pea will enable us to do this without very much difficulty.

The ripened ovary of the pea becomes the pod, with the seeds, or "peas" contained within it. If this be opened and laid out flat, it will be found to consist of two equal halves divided down the middle by a thickened rib. The peas are attached to each half along the margin. Place a leaf of the pea by the side of the opened pod; it will at once become evident that, by folding the leaf in half along the mid-rib, an object very similar to the pod is produced, and it requires very little prompting to reveal the pod as a seed-bearing leaf folded in half, and with the free margins joined together.

If the ripened ovary of the garden stock be cut through transversely, it will be found to possess two chambers, in each of which seeds occur. This may be likened to two pea pods placed side by side, with their broad surfaces in contact, except that in the stock the two pods have grown together. Similarly, the violet has three compartments to its ovary, formed in the same way, while other plants have much larger numbers. The leaves which have been modified into seed-bearing bodies are called carpels, and, as has been shown, an ovary may be made up of one or a number of these.

What it Does.

Each part of a typical flower has a definite duty to perform. The sepals serve to form a protective envelope to the young blossom while it is still tender and undeveloped in the bud. The petals act as organs of attraction, or bright banners to advertise to the insects the presence of nectar in the flower. The stamens and pistil are concerned with the production of fertile seeds. But although these are the normal duties of the several parts in many flowers, certain of them are called upon to perform special work. In such cases a "rearrangement of the staff" is necessitated.

The handsome bougainvilleas are examples of this, for in these brilliant flowers the coloured portions are not the petals at all, but leafy bracts which have taken over the usual work of the corolla. The poinsettias, valued as ornamental subjects by reason of the vivid scarlet-coloured terminal leaves, have small, inconspicuous flowers, the flaming leaves surrounding the flowering head being sufficient to attract insects to them. In the fuchsia the green calyx has become modified into a bright red-coloured cap, which is much more conspicuous than the deeper purplish petals of the flower.

Pendant blossoms frequently show gaily coloured sepals, the reason being that, to winged insects passing above the plants, the petals, being turned downwards, are practically invisible, and were the calyx to retain the green colour characteristic of this part in most flowers, the blossoms would stand a poor chance of attracting visitors. The bleeding heart and the nasturtium are other plants having drooping blooms with coloured calyces.

The delphinium and columbine are examples of flowers in which the petals have been changed into receptacles to hold the nectar, and the blue or purple portions of the blossoms of these popular garden favourites are made up of coloured sepals, the corolla being visible in the inside of the flower as a small pale, scale-like body. In the marsh marigold, again, the petals are shrunk into nectaries, and the glossy, rich, yellow bodies, usually referred to as petals, are the sepals which have assumed an attractive appearance. The winter cherry may also be mentioned here. In this plant the highly coloured and inflated calyx forms a sort of bladder, which entirely envelops and conceals the other parts of the flower.

In the beautiful white arum lily, the large white object usually called the "flower" is really nothing of the kind. The real flowers are tiny and situated at the base of the thick, yellow, spike-like body which may be seen projecting from the top of the white portion. The latter is a special structure called a spathe and forms a covering envelope, or sheath, to the flowers proper. It serves to attract insects and thus, in this sense, takes the place of the conspicuous petals of other plants.

The stamens may also operate as organs of attraction, besides carrying out their more usual work as pollen bearers. The acacias and mimosa are examples of plants in which, in the absence of either brightly coloured petals or sepals, the male parts perform the duties of advertising agents.

BOUGAINVILLEA.

Anyone visiting the beautiful garden of Mr. Thomas, at Indooroopilly, will be impressed with the many possibilities of design and effect that can be made with this very hardy and showy climber (writes W.B. in the "Daily Mail"). The appreciation of the bougainvillea is shown by the hundreds of persons who go to see it in bloom. It is a hardy plant, and loves sunshine, and there is no reason why it should not be more widely grown. A little time and patience will amply repay anyone who contemplates its culture. Cuttings strike readily as soon as the blooming period is over. They should be about 12 in. long. Select last season's growth, and plant in sandy soil in a shady place.

Put the cuttings about 6 in. deep in the soil, and press down firmly. Keep the ground moist, not soaking wet. If you require a more immediate result, obtain plants from the florists in pots. There are about seven different colours to select from. When the plants have grown to a height of 2 ft. then select your design and prune accordingly. To train the plant make a skeleton design of wire, and then trim the plant by removing all shoots that may be growing in a direction that is not required. About May or June pruning must be stopped, as all the new shoots then appearing will be flowering shoots. As soon as the blooming period is over commence pruning again to still improve your design.

There are many methods of growing bougainvillea, and one that finds favour with many is that of planting it around an old tree that is not wanted, and ringbarking the tree when the bougainvillea is firmly established. It will then hang down from the branches of the tree and form a beautiful garland of bloom. It is an evergreen and never appears unsightly.

DRACÆNA.

Dracenas are hardy plants with very richly coloured and variegated foliage. They are closely allied to the genus cordylina, with which they are often confused. The difference between the two is chiefly in the character of the fruits, there being generally one ovule in the dracena and many ovules in the cordylines. Dracenas are among our most beautiful foliage plants. Propagation is generally by cuttings, which root readily at any time of the year. The old stem of the plant, cut into short lengths and planted in a compost, invariably roots, and throws up shoots which may be potted up. The root suckers which are often found upon old plants are also useful for increasing stock. All that is necessary is to cut them off and pot them.

The best soil for potting the young stock is made of equal parts of loam and leaf mould, with sufficient sand to keep the soil porous. Dracenas do not require large pots, but they must be firmly potted and given plenty of water.

Mealy bugs and thrips are the chief enemies. The large leaves permit of the free use of the sponge. Dracenas are fine indoor plants, but they must not be kept inside for more than a week or so at a time, and they must be kept out of draughts.

Farm Notes for November.

FIELD.—Farmers are commencing to realise that quick-maturing wheats which possess a degree of rust resistance are more dependable than the slow-growing and often rust-susceptible kinds, which are gradually giving place to these and mid-season varieties.

Growers are advised to make every preparation to work up the surface of the ground immediately after the removal of their crops, so that the soil may be put into good condition to receive any rain which falls, the conservation of which is the best guarantee for the success of the next succeeding crop. Such initial preparation also encourages the early growth of all foreign and weed seeds, and permits of their eradication by the implements used to produce the desired soil mulch. In such manner paddocks are kept clean and the purity of crops is maintained. The careful preparation of areas intended for maize-planting cannot be too strongly impressed upon growers. Deep and thorough ploughing, followed by cross-ploughing and subsequent cultivation of the soil, must precede sowing if success would be attained; and all efforts must be concentrated to obtain a good surface mulch. Failure to follow up the subsequent sowings by harrowing prior to the appearance of the young plant conduces to weed growths and very often entails, by neglect of this operation, subsequent hand-hoeing between the plants in the drills. Harrowing should be discontinued before the plant breaks through the surface, otherwise damage will accrue to the tender shoots of the young plants. When the young maize plant has hardened up it may, with advantage, be lightly harrowed in the direction of the drills, but such practice must discontinue once the plant has attained a height of 6 inches. Close cultivation by inter-row cultivation implements is necessary after every shower to conserve moisture and to prevent weed growth, care being taken to ensure each cultivation being shallower than the preceding one, and so prevent damage to the root system of the plant, which is extensive. Inter-row cultivation should cease with the advent of the cob on the plant; and, if proper attention has been given to the crop, it should, at this period, be unnecessary. Where crops are planted on the check-row principle, inter-row cultivation is facilitated, and more even crops result.

The French millets (red and white), owing to their rapid maturing qualities, form excellent intermediate or supplementary crops, and are suitable for present sowing. Their value for fodder and seed purposes is worthy of more general recognition at the hands of the average farmer.

Past dry periods have impressed upon us the necessity of providing during good seasons against the return of less favourable ones, and in this connection the cultivation of quick-growth fodder plants appeals to us. Many varieties of useful classes of fodder can be cultivated over a large portion of this State; chief of which, perhaps, are the sorghum family for grain and fodder purposes. Of the latter, Sudan grass has much to commend it, and is fast becoming one of the most favoured by stockowners. Grain sorghums, of which Feterita, Red Kafir, and the various Milos are examples, should occupy a more prominent position for purposes of horse and pig feeding, and are particularly suited to those localities which are unsuitable for maize production. Some varieties of sorghum have strong frost-resisting qualities, and lend themselves to those localities where provision for some form of succulent fodder is necessary during the winter months.

Orchard Notes for November.

THE COASTAL DISTRICTS.

November is somewhat of a slack month for fruit in the coastal districts, as the citrus crop, excepting a few Valencia Late oranges, off-season lemons, and a few limes, is over. Pineapples are also scarce, as the late spring crop is finished, and there are only comparatively few off-season fruits ripening. The main summer crop of fruit in the principal producing districts is only in the flowering stage, though that in the more tropical parts is ready for marketing. It is also a slack month for bananas, as the summer fruit is not yet fully developed, and the bunches that make their appearance are usually poor. They have been slow in developing on account of the comparatively cool weather of winter and early spring, when the suckers were more or less at a standstill. Young suckers should, however, be making vigorous growth now, and the plantation will require constant attention to prevent the stools being overcrowded with too many suckers. Keep the land well worked and free from weeds of all kinds, as good growth now means good bunches in the autumn and early

winter. Where there is a danger of the soil washing badly with heavy rain, rows of Mauritius, velvet, or other suitable beans should be planted at right angles to the fall of the land, as the growth they make will tend to hold the soil and thus save any from being washed away. When planting beans of any kind, either to prevent washing or for green manuring, don't forget to manure them, as thereby you will get a much greater yield, and as none of the manure is removed from the soil, as the crop is allowed to lie and rot on the ground, it is all made use of eventually by the permanent crop.

A good all-round manure for a bean crop is a mixture of 1 cwt. of sulphate of potash and 4 cwt. of basic superphosphate or finely-ground phosphatic rock to the acre, and, if the soil is deficient in lime, a dressing of not less than half a ton to the acre will be found very beneficial, as all leguminous plants require lime to yield their maximum return both of haulm and pulse. The pineapple plantations require to be kept in a state of thorough tilth, and no weeds must on any account be allowed to grow. If blady grass makes its appearance it must be stamped out, as once it gets established in the rows it is only a short time before it takes control, and the plantation is ruined, so that it can only be brought back into profit by taking out the pines, killing the blady grass, and, after thoroughly and deeply working the land, manuring it and replanting.

The planting of pineapples and bananas can be continued throughout the month, taking care to see that the land is properly prepared and that the advice given in previous monthly notes is followed. Young papaw plants that have been raised in the seed bed can be set out now, as also can young passion fruit. Citrus orchards require to be well looked after; the ground must be kept in a state of thorough tilth, and if the trees show the slightest sign of distress, owing to lack of moisture in the soil, they must be given a thorough irrigation if water is available for this purpose. The trees should be carefully examined from time to time so as to note when young scale insects of any kind are hatching out, and when this is noted they should be sprayed with a weak emulsion of a miscible oil consisting of one part of oil in forty parts of emulsion, as this is quite strong enough to kill any young scales before they develop their protective covering. As stated in these notes previously, no oil sprays should be used when the trees are suffering from lack of moisture, as they are then likely to do more damage than good to citrus trees. If scale insects are very bad, and it is important that the trees are sprayed, a weak lime-sulphur spray, or even a soap and tobacco or weak resin wash, will kill the young scales as they hatch out. In the earlier districts a keen lookout must be kept for the first appearance of the mites, which are the direct cause of the darkening of the skin of the fruit known as "Maori." The first indication of the trouble is that when the sun is shining on the young fruit, it appears to be covered with a grey dust, and if the fruit is examined with a good lens it will be seen to be covered with large numbers of small yellowish slug-like insects which are living on the skin. Spraying with sodium or potassium sulphide washes, as recommended by the Department, or with a weak solution of lime sulphur, will destroy these insects and prevent the fruit from turning black. Borers of all kinds should be looked for and destroyed wherever found. Water sprouts, if not already removed, should be cut away. Vines will require careful attention, and the vineyard should be kept in a state of thorough cultivation. Spraying for downy mildew and black spot should be continued, if necessary, as well as sulphuring to prevent oidium.

Fruit fly must be systematically fought whenever seen, and special care must be taken to gather and destroy any early ripening peaches or other fruit that may be infested. If this is done systematically by all growers, as provided by the Diseases in Plants Act, there will be many less flies to attack the later crops of mangoes and other fruits.

Leaf-eating insects of all kinds should be systematically fought wherever seen, by spraying with arsenate of lead, and potatoes and tomatoes should be sprayed with a combined spray consisting of Bordeaux or Burgundy mixture and arsenate of lead, so that diseases such as early blight and Irish blight may be prevented and leaf-eating insects, which frequently cause very heavy losses to these crops, be destroyed.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

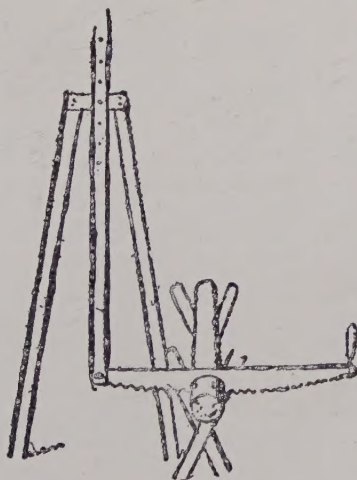
Keep the orchards and vineyards in a thorough state of cultivation, so as to keep down all weed growth and conserve moisture in the soil. This is important, as, if a long spell of dry weather sets in, the crop of summer fruit will suffer severely from the lack of moisture. Citrus trees should be irrigated where necessary, and the land kept in a state of perfect tilth. Spraying for codlin moth should be continued, and all pip fruit trees must be bandaged at the beginning of the month;

further, the bandages must be examined at frequent intervals and all larvæ contained in them destroyed. The neglect to spray thoroughly and to attend to the bandages properly is responsible for the increase in this serious pest in the Granite Belt, and growers are warned that they must pay more attention to the destruction of this pest if they wish to grow pip fruit profitably. Fruit fly may make its appearance in the cherry crop; if so, every effort should be made to stamp out the infestation at once, as, unless this is done, and if the fly is allowed to breed unchecked, the later ripening crops of plums, peaches, apples, pears, apricots, and Japanese plums are bound to become more or less badly infested. Combined action must be taken to combat this, the most serious pest of the Granite Belt, and growers must realise that, unless they take this action and see that careless growers do not breed the fly wholesale, they will never keep it in check, and it will always be a very heavy tax on their industry. Rutherglen bug is another serious pest in this district, and is propagated by the million by careless orchardists. The best remedy for this pest is to keep the orchard clean and free from weeds. Brown rot in fruit should be watched for carefully, and, on its first appearance in a district, all ripening fruit should be sprayed with the sodium sulphide wash.

All kinds of leaf-eating insects should be kept in check by spraying with arsenate of lead, and all grape vines, potatoes, and tomatoes should be kept sprayed with Bordeaux or Burgundy mixture, the former for black spot and downy mildew, and the latter for early and late (Irish) blight.

ONE-MAN SAW.

A very handy sawing device for sawing up the trunks of small trees into short blocks for fuel, to be operated by a single man, is rigged from the ordinary two-man crosscut saw, as shown in the accompanying illustration taken from "Country Gentleman." Two scantlings, each 8 feet long, are driven into the ground about 3 feet apart, with their upper ends leaning almost together. Two 3-inch strips are nailed across the sides of the tops of these posts, through the centre of which is bored a $\frac{1}{2}$ -inch hole. A bolt of the same size is passed through this hole, and through a hole in a 2 inch by 2 inch scantling standing vertically—this scantling being on the outside of the cross strips—providing a free swinging support for the end of saw blade. This is shown in the illustration.



There are several holes in this pendulum scantling for adjusting the blade up or down. One of the handles is removed from the blade, and a small bolt is passed through the small hole in the end of the blade and through the lower end of the scantling. Either a sawhorse may be used or cross stakes may be driven in the ground as illustrated to hold the legs while being sawed. As the saw moves back and forth, the swinging scantling holds the end of the saw steady. The device is easily rigged, and is very much appreciated when once tried by those who need to cut wood for fuel.

ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S., and A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

MOONRISE.

1927.	OCTOBER.		November.		O	Nov.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
1	5.34	5.50	5.3	6.9	a.m.	a.m.
2	5.33	5.51	5.2	6.10	8.36	9.41
3	5.32	5.52	5.1	6.11	9.15	10.37
4	5.31	5.52	5.0	6.11	10.53	p.m.
5	5.29	5.53	5.0	6.12	11.49	12.42
6	5.28	5.53	4.59	6.13	p.m.	1.44
7	5.27	5.54	4.58	6.13	12.48	2.49
8	5.25	5.54	4.57	6.14	1.53	3.56
9	5.24	5.55	4.57	6.15	2.59	5.3
10	5.23	5.55	4.56	6.15	4.6	6.12
11	5.22	5.55	4.56	6.15	5.13	7.22
12	5.22	5.56	4.55	6.16	6.21	8.32
13	5.21	5.56	4.55	6.17	7.30	9.36
14	5.20	5.57	4.54	6.18	8.38	10.36
15	5.19	5.57	4.54	6.19	9.46	11.30
16	5.18	5.58	4.53	6.20	10.15	a.m.
17	5.17	5.59	4.53	6.21	11.51	12.17
18	5.16	5.59	4.53	6.21	...	12.55
19	5.14	6.0	4.52	6.22	a.m.	1.30
20	5.13	6.1	4.52	6.23	12.46	2.3
21	5.12	6.1	4.51	6.24	1.36	2.33
22	5.11	6.2	4.51	6.25	2.18	3.2
23	5.10	6.2	4.51	6.26	2.56	3.2
24	5.9	6.3	4.51	6.27	3.29	3.32
25	5.8	6.4	4.51	6.28	4.0	4.3
26	5.7	6.4	4.50	6.29	4.30	4.56
27	5.7	6.5	4.50	6.29	4.59	5.14
28	5.6	6.6	4.50	6.30	5.30	5.56
29	5.5	6.6	4.50	6.31	6.2	6.44
30	5.4	6.7	4.50	6.31	6.36	7.36
31	5.4	6.8	...	...	7.14	8.32
					7.56	9.30
					8.48	...

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

4 Oct. (First Quarter 12 1 p.m.
 11 " ○ Full Moon 7 14 a.m.
 18 ") Last Quarter 12 31 a.m.
 26 " ● New Moon 1 37 a.m.

Perigee 11th October, at 1 24 p.m.

Apogee 25th October, at 11 48 a.m.

A daylight occultation of Saturn will take place on the 1st about 12.30 p.m. when the crescent Moon and Saturn will be very high in the sky, to the south-east of the Sun, but too near to it for good observation.

The occultation of Psi Orphinci by the Moon will take place on the evening of the 1st soon after 6.30. This should form an interesting spectacle with binoculars or telescope as the Moon, being only six days old, will not be too bright and the dark portion of its disc will first obscure the star. If the sky is clear it can be observed from any part of Queensland.

The big planet Jupiter, not so resplendent as Venus, still less when it is near the full-orbed Moon on the 9th will be apparently moving westward, or in a retrograde direction amongst the small stars of Pisces. The Moon during the first eight days of the month will apparently be passing through the constellations Scorpio, Sagittarius, Capricornus, and Aquarius, reaching Pisces when near Jupiter.

On the 17th Venus will be at its greatest brilliancy. Mercury will be at its greatest elongation, 25 degrees east, on the 18th.

Mars will be nearly in a line with the Sun on the 21st, but far beyond. At midday the planet will be less than one diameter of the Moon below the Sun.

At 11 p.m. on the 21st the moon will pass below or northward of Venus, at the wide distance of 8 degrees, when both are far below the horizon. Throughout October Venus will be the morning star.

The planet Neptune and Regulus, the brightest star in Leo, will be apparently very near to each other during this month, more especially on the 26th when Neptune will be only two degrees northward of Regulus. They may be best observed about an hour before sunrise, when about 12 degrees north of east; binoculars or telescope will be required to observe the planet.

3 Nov. (First Quarter 1 16 a.m.
 9 " ○ Full Moon 4 36 p.m.
 16 ") Last Quarter 3 28 p.m.
 24 " ● New Moon 8 9 p.m.

Perigee 9th November, at 1 18 a.m.

Apogee 21st November, at 4 54 p.m.

On the 3rd the occultation of Kappa Capricorni by the Moon will occur about 9.45 p.m. at Rockhampton and somewhat earlier at more northern places in Queensland.

It will be interesting to notice the nearness of Jupiter and the Moon late at night on the 5th, especially near the time of the Moon's setting.

Between 10.30 p.m. and 11 p.m. on the 10th Omega Tauri will be occulted by the Moon.

The interior conjunction of Mercury with the Sun on the 10th will be of special interest on this occasion as the planet will make a transit of the Sun's face.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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